TOBACCO USE PREVENTION FOR THE YOUNG (TUPY): DEVELOPMENT AND EFFECTIVENESS OF AN INTERACTIVE MEDIA AWARENESS MODULE FROM ADOLESCENTS' PERSPECTIVE

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Abstrak

Penggunaan produk tembakau (PT) adalah masalah sosial utama dalam kalangan remaja walaupun terdapat banyak strategi untuk menanganinya. Kajian ini bertujuan membina dan menguji keberkesanan modul media interaktif untuk mencegah penggunaan PT daripada perspektif remaja (TUPY-S). Kajian ini menggunakan kaedah campuran dengan kombinasi teknik pembinaan modul oleh Russell. Perspektif remaja telah diteroka untuk menilai keperluan, kandungan serta mod penyampaian modul. Kandungannya telah dibina dengan menyerapkan perspektif remaja ke dalam teori sosial iaitu Health Belief Model, Social Learning Theory dan Theory of Planned Behavior. Kesahan kandungan telah dijalankan dalam kalangan enam orang pakar dan sejumlah 10 orang remaja. TUPY-Q mengandungi item untuk menilai TUPY-S iaitu pengetahuan, sikap, keinginan mengguna dan penolakkan efikasi kendiri. Keberkesanan TUPY-S dinilai melalui satu kajian kuasi dalam kalangan 217 remaja berisiko tinggi untuk menggunakan PT pada tiga peringkat: pra-intervensi, dan minggu-1 dan minggu-8 pos-intervensi. Sejumlah 108 and 109 remaja lelaki berisiko diantara umur 10 dan 11 tahun ditempatkan dalam kumpulan kawalan dan intervensi untuk menentukan keberkesanan TUPY-S. Pengukuran berulangan ANCOVA telah digunakan untuk menentukan kesan intervensi merentasi masa. Hasil kajian mendapati pengetahuan bagi kumpulan intervensi telah menunjukkan peningkatan yang signifikan. Walaupun tiada perbezaan yang signifikan untuk sikap, keinginan dan keengganan mengguna tembakau, keputusan keseluruhan menunjukkan kesan yang signifikan kepada kumpulan intervensi dalam tempoh kajian. Modul ini berkesan untuk meningkatkan pengetahuan remaja terhadap penggunaan PT, walaupun secara relatifnya, keberkesanan modul ini lebih rendah untuk aspek sikap, keinginan dan keengganan untuk menggunakan PT dalam kalangan remaja berisiko. Maka, secara keseluruhan TUPY-S sesuai untuk digunakan oleh remaja generasi kini di Malaysia.

Kata kunci: Tembakau, Pencegahan, Interaktif, Media, Remaja

Abstract

Tobacco product (TP) use is a major social problem among adolescents despite many strategies implemented to address it. This study aims to develop and determine the effectiveness of an interactive media module on TP use prevention from adolescents' perspective (TUPY-S). This study utilised mixed methodology in combination with Russell's technique of development of modular instruction. The adolescents' perspective was explored for the need assessment, content and mode of delivery. The content was constructed from the adolescents' perspective integrated with social theories including the Health Belief Model, Social Learning Theory and Theory of Planned Behavior. The content and face validities were done among six experts and 10 early adolescents respectively. Tobacco Use Prevention for The Young Questionnaire (TUPY-Q) was constructed that consists of the criterion items to evaluate Tobacco Use Prevention Strategy for The Young (TUPY-S) module which include knowledge, attitude, intention to use and refusal self-efficacy. The effectiveness of TUPY-S was evaluated in a quasi-experimental study among 217 male adolescents at risk to use TP at three intervals: pre-intervention, at 1-week and 8-week post-intervention. A total of 108 and 109 male adolescents aged 10 to 11 years old were assigned into control and intervention groups respectively to determine the effectiveness of TUPY-S. The Repeated Measure ANCOVA was applied to determine the effect of intervention across time. The findings indicate that knowledge was significantly improved in the intervention group. Although there was no statistically significant difference in attitude, intention, and refusal to use TP, the overall outcomes were favourable towards the intervention group during the study. This module is effective in improving knowledge to use TP among adolescents at risk, despite being moderately so in terms of attitude, intention, and refusal to use TP. Therefore, in general TUPY-S is suitable for the adolescents of the current generation living in Malaysia.

Keywords: Tobacco, Prevention, Interactive, Media, Adolescence

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List of Abbreviations

CDC	Center of Disease Control
FCTC	Framework Convention on Tobacco Control
GYTS	Global Youth Tobacco Survey
NHMS	National Health Morbidity Survey
PT	Produk tembakau
SHS	School Health Survey
TP	Tobacco product
TPU	Tobacco product use
WHO	World Health Organization

List of Appendices

Publications and scientific presentations

1. Zin, F. M., Hillaluddin, A. H., & Mustaffa, J. (2017). Tobacco Use Prevention for the Young (TUPY-S): Development, Validity and Reliability of an Interactive Multimedia Strategy from the Adolescents' Perspective in Malaysia. *Asian Pacific Journal of Cancer Prevention, 18*(5), 1435-1443.

2. Zin, F. M., Hillaluddin, A. H., & Mustaffa, J. (2016). Adolescents' Perceptions Regarding Effective Tobacco Use Prevention Strategies for their Younger Counterparts: A Qualitative Study in Malaysia. *Asian Pacific Journal of Cancer Prevention, 17*(12), 5113-5119.

3. Faridah MZ, Azlin HH, Jamaludin M. (2018) *The effectiveness of Tobacco Use Prevention Strategy for the Young (TUPY-S).* Kuala Lumpur Nicotine Addiction International Conference, PJ Hilton, Kuala Lumpur.

4. Faridah MZ, Azlin HH, Jamaludin M. (2016). *Exploring the adolescents' perspective on an effective tobacco use prevention strategy for the younger adolescents: a preliminary report.* National Symposium on Adolescent's Health, Johor Bharu, Johor.

5. Faridah MZ, Azlin HH, Jamaludin M. (2016). *Exploring the adolescents' perspective on an effective tobacco use prevention strategy for the younger adolescents.* International Social Development Conference, Bayview Hotel, Langkawi.

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7. Faridah MZ, Azlin HH, Jamaluddin M. (2015). *The underlying theories on smoking initiation among adolescents and its predictors.* 18th Family Medicine Scientific Conference, Primula Beach Hotel, Kuala Terengganu, Terengganu.

8. Faridah MZ, Azlin HH, Jamaluddin M. (2014). *Underlying social theories in tobacco use among adolescents.* First Seminar Postgraduate Indonesia-Malaysia, Human Resource Development of Indonesia-Malaysia. Universitas Padjadjaran, Bandung, West Java, Indonesia.

CHAPTER ONE

INTRODUCTION

The problem of adolescents smoking continues to be a concern in Malaysia. Local epidemiological studies on the prevalence of smoking among adolescents reported that more than 20% were smokers (Lim et al., 2006; Lim et al., 2010). Alarmingly, these findings are similar to adults as reported in the National Health and Morbidity Survey whereby 22.8% of the Malaysian adult population are smokers (Institute for Public Health (IPH), 2015). Similar findings were also reported in many other countries around the world (WHO, 2013). Furthermore, epidemiological studies showed that, almost all smokers started to smoke during their adolescence (Centers for Disease Control & Prevention, 2012a). Epidemiological studies in Malaysia reported the age of smoking initiation between 11 to 14 years old (Lim et al., 2010; Lipperman-Kreda, Friend, & Grube, 2014).

The impact of tobacco use does not only involve the physical health, but also includes the psychological and social aspect of life. Among the physical illnesses derived from tobacco include heart and lungs diseases, and cancers. Biologically, smoking is an addiction owing to its active addictive ingredient, known as nicotine (Kessler et al., 1997; US Department of Health Human Services, 2014). The addicts develop dependence towards this substance whereby their body will develop physical and psychological withdrawal symptoms in its absence. Eventually, an addict will develop tolerance, which forces the person to consume larger doses of the substance to get the same level of satisfaction (Eysenck, Arnold, & Meili, 1979). Hence, the process of smoking cessation becomes a challenging task.

Tobacco use is also a psychological disease. A substantial number of adolescent's smokes as a coping mechanism against stress which leads to impairment of mood control, cognition, and social and emotional skills. Similar coping mechanisms which have been adopted by adolescent include alcohol consumption and illicit drugs (Shonkoff, Richter, Van der Gaag, & Bhutta, 2012). Furthermore, tobacco use is proven to be related to the use of alcohol, heroine, and other substances which eventually would lead to substantial significant misconduct (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Jessor, 1991).

Moreover, tobacco use is a social phenomenon. The long existence of tobacco in the culture produces a normalization of smoking (Bandura, 1986). This factor is especially apparent among adolescents borne into a family of smokers. Social modelling by the parents and peers has been proven in many occasions as the main culprit in the introduction of tobacco to adolescents (Collins & Ellickson, 2004; Fidler, Wardle, Brodersen, Jarvis, & West, 2006; Griesbach, Amos, & Currie, 2003).

Globally, in view of the significant physical and psychosocial consequences of tobacco use, the known difficulty to quit once started and early stage of initiation, prevention and treatment of this disease have become a major industry for quite some time. Millions of dollars have been spent to provide treatment and develop preventive strategies. Unfortunately, the decrement in the total number of adolescents smoking has come to a near plateau and increment is eminent among girls (Institute for Public Health (IPH), 2015; WHO, 2013). Thus, there is an urgent need for developing prevention and positive adolescent development programs which are rigorously developed to suit the current lifestyles of the adolescents of the new era. A review by Shek and Yu (2011) on validated

adolescent prevention and positive adolescent development programs in Asia found an extremely limited number of validated programs in its communities. Moreover, there were comparatively more programs developed to address substance abuse compared to other social problems in adolescence including tobacco use. On top of that, there were very few rigorously designed evaluative studies of prevention and positive adolescent development programs over a long period of time in this region (Shek & Yu, 2011).

The Malaysian Ministry of Health and Ministry of Education have developed a few strategies on the tobacco prevention for the adolescents such as workshops on "Say NO to Smoking" and "Draw the Smoker's Body" through the Kelab Doktor Muda Program in primary schools (Ministry of Health & Ministry of Education, 2012). The general information on the contents of tobacco and its health effects are also included in the National Education Curriculum as a chapter in the "Pendidikan Kesihatan" and "Sains" textbooks for the primary school children (Jamaliyah, Abdul Halim, & Salleh, 2012; Sopia, Aseelawati, & Amir, 2013). However, these efforts together with massive public campaigns, have not shown a significant positive outcome, evidenced by the significant number of adolescents continue to smoke with earlier age of initiation and increasing trend among girls in this country (Institute for Public Health (IPH), 2015; WHO, 2013). Apparently, the high demand for resources including trained personnel, and significant duration of implementation and cost, have become the major limitations. Furthermore, as to date, to our knowledge, there has been no formal evaluation on the effectiveness of the programs. A more rigorously developed and evaluated, culturally adapted, cost effective, accessible and sustainable strategy is desperately in need.

As an effort to control tobacco endemic, the World Health Organisation (WHO) developed the first world treaty known as the WHO Framework Convention on Tobacco Control (FCTC) in May 2003 and has been ratified by more than 170 countries (WHO, 2003). Malaysia has actively joined the group since 2005. Malaysian Ministry of Health acts as the secretariat team for the FCTC Malaysia with the main conviction to adhere to the guidelines produced by the treaty through strengthening the legislation. The FCTC is a scientific, technical and economical evidence-based treaty that reaffirms the right of all people to the highest standard of health. It stresses on protecting the public health especially among the developing countries. Six out of 38 articles in the treaty have been identified as the efforts to control tobacco endemic including; 1) monitor tobacco use and prevention policies, 2) protect people from tobacco smoke, 3) offer help to quit tobacco use, 4) warn about the dangers of tobacco, 5) enforce bans on tobacco advertising, and 6) raise taxes on tobacco. Consequently, Malaysia has enacted the treaty in 2009 by using graphic health warnings on cigarette boxes. This effort has increased the knowledge and concerns about the harms of smoking and interest in quitting (Fathelrahman et al., 2010). Moreover, more than 70% of smokers perceived Graphic Health Warning Labels as "Thinking about health risks", "Unpleasant" and "Alarmed & Worries me" (WHO, 2011). In Malaysia, other programs accomplished by this treaty include the comprehensive bans on all types of promotions and raising the tax.

Apart from that, smoking behavior in adolescents has been considered as a transition through multiple stages. The process of turning into regular or nicotine dependent smokers generally takes up to three years (Department of Health Human Services USA, 1994; U.S. Department of Health and Human Services, 2012; McNeill, 1991). The

existence of such stages allows room for interventions to prevent its progression. Studies have shown that smoking behavior among adolescents commonly reaches a stagnant stage until adulthood (Wetter et al., 2004). Moreover, among those who become daily smokers as adults, only 9% initiated smoking after high school (Chassin, Presson, Sherman, & Edwards, 1991). Thus, most daily smokers started smoking earlier. To prevent a person from becoming a daily smoker, the predictors of such progression must be understood and acted upon especially among younger adolescents.

To complicate the matter, tobacco use among adolescents includes more than smoking cigarettes. The consumption of other tobacco products such as *Shisha* and *e-cigarette* has become recently more popular (Center of Disease Control, 2015; Institute for Public Health (IPH), 2015). The increasing emergence of multiple adolescents' entertainment centers have contributed to this unhealthy social phenomenon. Poor understanding regarding the similar health effects between these methods and cigarette smoking has been blamed to be the reason behind the increment, as the currently available preventive programs are focusing solely on cigarette smoking.

1.1 Study background

Currently, the Malaysian Ministry of Education integrated the education on tobacco use as a chapter in the current primary school curriculum text books on "Pendidikan Kesihatan" (Jamaliyah et al., 2012) and "Sains" (Sopia et al., 2013). The adolescents are exposed to this topic in 30-minute school sessions. The content of the sessions focused specifically on the negative health effects of tobacco use. On top of that, the Ministry of Education has also produced two modules on educating the adolescents; the Kelab Doktor Muda, regarding the health effects of smoking and teaching the way to say "NO"

to smoking. These modules are delivered in a workshop style with group activities whereby each group draws a human body with tobacco related diseases and performs life act on how to say "NO" to smoking. Unfortunately, to our knowledge, the effectiveness of these modules has never been rigorously evaluated in formal research. Furthermore, in the effort to prevent this social phenomenon, the Government has spent millions of ringgits in producing multiple public campaigns through the Malaysian Health Prevention Board (MySihat). The preventive strategies worldwide seem to have similar concept in smoking prevention (Shek & Yu, 2011; Thomas, McLellan, & Perera, 2013). These efforts do not seem to be achieving their goals. Evidently, the challenge is to provide an effective health education and preventive strategies which are accessible to many, cost effective and sustainable, attractive, interesting and meaningful to the young adolescents of the current generation.

Existing strategies on tobacco use prevention for the youth mainly derived from social theories (Ausems, Mesters, van Breukelen, & de Vries, 2002; Buller et al., 2008; Campbell et al., 2008; de Jong, Candel, Segaar, Cremers, & de Vries, 2014; Handayani, Wichaikull, & Boonpleng, 2015; Kolovelonis, Goudas, & Theodorakis, 2016; Koumi & Tsiantis, 2001; U. G. Lee, 2012; Melson, 2014; Mohammed, Eggers, Alotaiby, de Vries, & de Vries, 2016; Nădășan et al., 2016; Park, 2017; Resnicow et al., 2008; Stigler et al., 2007; Turhan, Onrust, Klooster, & Pieterse, 2017; Vartiainen et al., 2007; Verma, Muddaiah, Murthy, & Sanga, 2015). Significant numbers of strategies were adapted from existing programs (Bowen, Henderson, Harvill, & Buchwald, 2012; Campbell et al., 2008; Chen, Fang, Li, Stanton, & Lin, 2006; Chou et al., 2006; Cremers, Mercken, Candel, de Vries, & Oenema, 2015; de Graaf et al., 2017; de Jong et al., 2014; Melson,

2014; Mohammed et al., 2016; Nădăşan et al., 2016; Nordin, Mulud, Said, & Mohamad, 2017; Park, 2017; Sumartono, Sirait, Notosiswoyo, & Oemijati, 2012). However, the effectiveness of the interventions varies significantly (Table 2.1-2.3).

On the other hand, Killen (1985), in his review on the social pressure resistance training approach in preventing tobacco smoking, reported promising results in preventing and delaying cigarette smoking among adolescents. In the same review, the inadequacy of providing knowledge alone in the prevention of nicotine addiction was highlighted. The review reported that multiple previous prevention strategies using knowledge-based approach showed positive results in improvement in knowledge and attitude but lacking in ability to prevent smoking behavior (Killen, 1985).

Despite the abundant preventive strategies, almost all focus solely on cigarette smoking, ignoring the significant use of other tobacco products among the adolescents such as shisha and e-cigarette (Bauer & Kreuter, 2015; Center of Disease Control, 2015; Gravely et al., 2014; Institute for Public Health (IPH), 2015; Palipudi et al., 2015). Preventing the use of smokeless tobacco products, along with its smoked counterpart, is a significant component in the prevention strategies, hence accentuates the urgent need for a new program.

In conclusion, tobacco product use is a serious ongoing problem. Current available strategies seem to have not been able to control this global endemic. Hence, a new strategy is in need.

1.2 Problem statement

There is no denying that tobacco use among adolescents is a pressing problem worldwide despite many strategies implemented to prevent this global disease. Majority of tobacco users initiate smoking during their adolescence age (Bauer & Kreuter, 2015; Hammond et al., 2008; WHO, 2013). Adolescence seems to be the most convenient phase to prevent smoking behaviors and subsequently deflect significant smoking-related disorders in adulthood (Killen, 1985).

The impact of tobacco use does not only involve the physical health, but also includes the psychological and social aspect of life. Among the physical illnesses derived from tobacco include heart and lungs diseases, and cancers. Biologically, smoking is an addiction owing to its active addictive ingredient, known as nicotine Tobacco use is also a psychological disease. A substantial number of adolescent's smokes as a coping mechanism against stress which leads to impairment of mood control, cognition, and social and emotional skills. Similar coping mechanisms which have been adopted by adolescent include alcohol consumption and illicit drugs (Shonkoff, Richter, Van der Gaag, & Bhutta, 2012). Furthermore, tobacco use is proven to be related to the use of alcohol, heroin, and other substances which eventually would lead to substantial significant misconduct (Akers, Krohn, Lanza-Kaduce, & Radosevich, 1979; Jessor, 1991).

Moreover, tobacco use is a social phenomenon. The long existence of tobacco in the culture produces a normalization of smoking (Bandura, 1986). Globally, in view of the significant physical and psychosocial consequences of tobacco use, the known difficulty to quit once started and early stage of initiation, prevention and treatment of this disease

have become a major industry for quite some time. Millions of dollars have been spent to provide treatment and develop preventive strategies. Unfortunately, the decrement in the total number of adolescents smoking has come to a near plateau and increment is eminent among girls (Institute for Public Health (IPH), 2015; WHO, 2013). However, these efforts together with massive public campaigns, have not shown a significant positive outcome, evidenced by the considerable number of adolescents continue to smoke with earlier age of initiation and increasing trend among girls in this country (Institute for Public Health, 2015; WHO, 2013).

Countless efforts have been made by multiple bodies to combat tobacco use among the adolescents including school-based and community interventions, media based public education health promotions, tobacco advertising restrictions, legislation against selling to the under-aged, and increment in tobacco excise taxes. According to WHO, three billion people are now covered by national anti-tobacco campaigns and, thus, hundreds of millions of nonsmokers are less likely to start smoking. However, it remains a significant challenge to reduce smoking prevalence and tobacco consumption among adolescents (WHO, 2011).

Teaching method for health education has not changed since its integration into the school curriculum (Jamaliyah et al., 2012; Sopia et al., 2013). With the challenges posed by globalization leading to a world without limit, technological advances with the increasing use of electronic gadgets and software applications among our adolescents, and an explosive accessibility to information through internet use, there is a critical need for an up-to-date tobacco use prevention programs which are in congruent with current needs in delivering health education among the adolescents of this era. Moreover,

electronic gadgets have become more popular in seeking for knowledge as it provides visual based learning which seems more appealing to the younger generation.

Health education has been a priority of the government. Multiple efforts have been done specifically on tobacco prevention especially since Malaysia is a signatory of the world treaty, the FCTC, in 2003. Examples of such programs include “Tak Nak” campaign and prohibition of direct advertisements on tobacco products. The health effects of tobacco smoke have also been integrated into the primary school textbook. However, there seems to be a setback in the efforts since the number of adolescents’ smoking is still significant and there is an increasing trend among the girls, with younger age of initiation (Centers for Disease Control & Prevention, 2012a; Institute for Public Health (IPH), 2015; WHO, 2013).

In view of the major move into the digital era in this millennium, the teaching method needs to be replenished. Firstly, the inadequacy of the content of the program should be overcome. Secondly, the delivery should suit the current generation. The current effort of tobacco use prevention has a significant limitation in delivering the content whereby only two activities are included in the workshop namely “The smoker’s body” aiming to educate regarding the health effects of cigarettes and the short play on “Say No to Smoking” aiming to educate on how to refuse cigarette when offered. Hence, the current strategies are labor intensive, time consuming and costly.

Additionally, the view of the adolescents’ themselves should not be forgotten. What are their perceptions on an effective tobacco use prevention program? What do they think could prevent the non-smokers from initiating and the non-regular smokers progress into

a chronic smoker? Does information on tobacco use and religion provides a change in smoking behavior? To our knowledge, the adolescents' view has been rarely used in development of tobacco use prevention strategies.

Cigarette smoking is not the only method where nicotine is consumed by the youth. Use of other tobacco products has become more apparent or rather re-emerged into the surface. The increasing use of other tobacco products such as *shisha* and *e-cigarette* (Center of Disease Control, 2015; Gravely et al., 2014; Institute for Public Health (IPH), 2015; Nik Mohamed, Mohamad Noor, Kaur, & Abu Bakar, 2010) complicates the current tobacco use prevention programs. *Shisha* which has been consumed for hundreds of years has become increasingly "re-popular" (Hammond et al., 2008). On top of that, owing to the development of technology, *e-cigarette* has created a new era in nicotine consumption. Despite these facts, the currently available strategies are mainly focused on smoked tobacco (Koumi & Tsiantis, 2001; Lee, Wu, Lai, & Chu, 2007; Shek & Yu, 2011; Tahlil, Woodman, Coveney, & Ward, 2013; Woo, 2008).

Thus, there is a need to review the health education on tobacco use prevention holistically to allow an effective delivery of knowledge to the target population. The method of delivery should allow variability in the content and unlimited accessibility to ensure sustainability.

1.3 Rationale

Multiple tobacco use prevention strategies have been rigorously developed and utilized globally, producing a variety of results in effectiveness studies. However, as to date, very few of the previously developed strategies took adolescents' perception into

consideration in developing its content. Locally, there is no specific tobacco use prevention program being rigorously developed let alone to suit the culture. In Malaysia, most of the previously developed strategies are classroom based using pre-trained workforce, with significant limitation in reaching the target population. The current study may produce an independent self-directed interactive teaching material which not only reduces the need to train workforce but is also widely accessible. The content includes the conventional way of delivering health education, which not only focuses on cigarette smoking, but also the recently emerging tobacco products such as *shisha* and *e-cigarette*. Since primary school children have been given basic health education on tobacco use in their school curriculum, this research will provide an insight on the effectiveness of the basic health education. The momentum of this study is the desire to prevent youth from initiating tobacco use by improving their tobacco related knowledge and attitude and strengthening the refusal self-efficacy against tobacco use.

1.4 Conceptual definitions

1.4.1 Tobacco products (TP)

Tobacco products refer to any substances manufactured from tobacco including those smoked (cigarettes, cigars, and pipes), and other tobacco products (shisha, e-cigarette and tobacco chewing) (Institute for Public Health (IPH), 2015).

1.4.2 Tobacco products use (TPU)

Tobacco products use refer to the consumption of any tobacco product (TP). The Centre of Disease Control (CDC) defined stages of TPU among adolescents based on frequency and recency (Centre of Disease Control, 2012);

i. *Never TPUs* are those who denied ever trying cigarette.

ii. *Experimental TPUs* are those who admitted trying cigarettes but denied smoking within the past 30 days or ever smoking regularly.

iii. *Intermittent TPUs* are those who reported using TP between 1 and 29 out of the past 30 days.

iv. *Regular/Established TPUs* are those who reported using TP daily within the past 30 days.

1.4.3 Youth

Youth refers to individuals aged 10 until 19 years old who are also known as adolescents (Ascencios et al., 2011; WHO, 2015). They can be further subdivided into two stages;

i. early (10 to 14 years old)

ii. late (15 to 19 years old)

1.4.4 Prevention

Prevention is an act to protect, promote, maintain health and well-being, and prevent disease, disability and premature death (Viera & Power, 2012). There are three categories of prevention (Viera & Power, 2012; Vu & Moser, 2015);

i. Primary prevention aims to prevent disease before it occurs and directed at healthy individuals.

ii. Secondary prevention aims to reduce the impact of a disease that has already occurred to a halt or slow its progress.

iii. Tertiary prevention refers to efforts to improve the outcomes of those with the disease and consequently preventing further morbidity.

This study is an effort involving primary and secondary preventions whereby the underlying objective is directed to prevent youth from initiating smoking and halt further progression among those who have tried smoking (Chou et al., 2006).

1.5 Operational definitions

1.5.1 Tobacco related knowledge

Improving tobacco related knowledge is an important outcome measured in tobacco use prevention effectiveness studies (Ghrayeb, Rusli, Al Rifai, & Ismail, 2013; Kolovelonis, Goudas, & Theodorakis, 2016; Koumi & Tsiantis, 2001; Lee et al., 2007; Nordin, Mulud, Said, & Mohamad, 2017; Shegog et al., 2005; T. M. Smith, Talley, Hubbard, & Winn, 2008; Stigler et al., 2007; Tahlil, Woodman, et al., 2013; Tahlil, Woodman, Coveney, & Ward, 2015; Verma, Muddaiah, Murthy, & Sanga, 2015). Most of the studies focused on health-related knowledge. According to the Health Belief Model, knowledge is a predictor for a behavior change (Rosenstock, 1990).

In this study, the knowledge component was developed according to the content of Tobacco Use Prevention Strategy for the Young module (TUPY-S), among which include types of tobacco products and contents, health-related knowledge on active and passive smokers, and family value (Appendix 2 & 7). The level of knowledge was measured by the Tobacco Use Prevention Strategy for the Young Questionnaire (TUPY-Q). Higher scores indicate higher levels of knowledge.

1.5.2 Tobacco related attitude

Attempt to change attitude is the main focus of many tobacco use prevention studies (Ausems, Mesters, van Breukelen, & de Vries, 2002; Bowen, Henderson, Harvill, &

Buchwald, 2012; de Graaf et al., 2017; Hammond, 2011; Kolovelonis et al., 2016; Koumi & Tsiantis, 2001; Lee et al., 2007; U. G. Lee, 2012; Mohammed, Eggers, Alotaiby, de Vries, & de Vries, 2016; Rath, Williams, Rubenstein, Smith, & Vallone, 2015; Resnicow et al., 2008; Shegog et al., 2005; Tahlil, Woodman, et al., 2013; Tahlil et al., 2015; Verma et al., 2015). The Theory of Planned Behavior further supports the efforts (Ajzen, 1991).

In this study, the attitude component was developed according to the content of TUPY-S and adapted from the questionnaire used in Lee et al. (2007) (Appendix 2 & 7). The level of attitude was measured by the Tobacco Use Prevention strategy for the Young Questionnaire (TUPY-Q). Higher scores indicate higher levels of positive attitude against tobacco use.

1.5.3 Intention to use tobacco products

In primary prevention, the utmost aim is to reduce intention from conducting a behavior. This effort was further supported by the Theory of Planned Behavior whereby intention is regarded as the precursor for a behavior (Ajzen, 1991). Hence, attempts to reduce intention were used in multiple previous similar studies (Ausems et al., 2002; Bate et al., 2009; Bowen et al., 2012; Buller et al., 2008; Cremers, Mercken, Candel, de Vries, & Oenema, 2015; de Graaf et al., 2017; de Jong, Candel, Segaar, Cremers, & de Vries, 2014; Kolovelonis et al., 2016; Koumi & Tsiantis, 2001; Lee et al., 2007; Mohammed et al., 2016; Norman, Maley, Li, & Skinner, 2008; Park, 2017; Perry, Stigler, Arora, & Reddy, 2009; Rath et al., 2015; Shegog et al., 2005; Stigler et al., 2007; Sumartono, Sirait, Notosiswoyo, & Oemijati, 2012; Tahlil, Woodman, et al., 2013; Turhan, Onrust, Klooster, & Pieterse, 2017; Verma et al., 2015).

In this study, the intention to use component was adapted from the questionnaire used in Lee et al. (2007) (Appendix 2 & 7). The level of intention was measured by the Tobacco Use Prevention strategy for the Young Questionnaire (TUPY-Q). Higher scores indicate higher levels of intention.

1.5.4 Refusal self-efficacy

Self-efficacy is believed to be a situation specific focus on beliefs about one's personal abilities in specific settings (Bandura, 1977). According to the Health Belief Model by Rosenstock, Strecher, and Becker (1988), for a behavioral change to succeed, people must have an incentive to act, feel threatened by their current behavioral patterns, believe that the change has a valued outcome at acceptable cost, and feel themselves competent (self-efficacious) to implement that change. Hence, self-efficacy and refusal have become another significant outcome measured in effectiveness of a preventive strategy (Ausems et al., 2002; Chen, Fang, Li, Stanton, & Lin, 2006; Handayani, Wichaikull, & Boonpleng, 2015; Kolovelonis et al., 2016; Lee et al., 2007; Mohammed et al., 2016; Norman et al., 2008; Resnicow et al., 2008; Stigler et al., 2007; Turhan et al., 2017).

In this study, the refusal self-efficacy component was adapted from the questionnaire used in Lee et al. (2007) (Appendix 2 & 7). The level of refusal self-efficacy was measured by the Tobacco Use Prevention strategy for the Young Questionnaire (TUPY-Q). Higher scores indicate higher levels of refusal self-efficacy.

1.6 Research questions

This study seeks to answer the following questions:

1. What is the adolescents' perspective on an effective TPU prevention program?
2. Is an interactive multimedia tobacco using prevention program effective in improving;
   i. knowledge
   ii. attitude
   iii. refusal self-efficacy

   on the TPU among adolescents?
3. Is an interactive multimedia TPU program effective in reducing the intention to use TP among adolescents?

1.7 Research objectives

1.7.1 General objectives

The purpose of this study is to develop and determine the effectiveness of an interactive multimedia tobacco product use prevention strategy (TUPY-S), for the adolescents living in Malaysia.

1.7.2 Specific objectives

i. To explore the adolescents' perspective on an effective tobacco product use (TPU) prevention program.

ii. To develop, validate and determine the reliability of an interactive multimedia tobacco product use prevention strategy (TUPY-S).

iii. To develop, validate and determine the reliability of the knowledge, attitude, intention to use and refusal self-efficacy questionnaire (TUPY-Q).

iv. To compare the change in mean scores of knowledge within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

v. To compare the change in mean scores of attitude within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

vi. To compare the change in mean scores of intention to use within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

vii. To compare the change in mean scores of refusal self-efficacy within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control

group at 1-week and 8-week post-intervention from baseline (Time*Group effect)

1.8 Hypotheses

H_{A1} There is a significant change in mean scores of knowledge within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

H_{A2} There is a significant change in mean scores of attitude within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

H_{A3} There is a significant change in mean scores of intention to use within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

H_{A4} There is a significant change in mean scores of refusal self-efficacy within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).

1.9 Variables

1.9.1 Independent Variable

The study groups (intervention and control)

1.9.2 Dependent Variables

i. knowledge

ii. attitude

iii. intention to use

iv. refusal self-efficacy

1.10 Significance

This research project is called TUPY which stands for the Tobacco Use Prevention Project for the Young. It aims to be an attempt to consider adolescents' view exclusively in developing a TPU prevention program for their younger counterparts, supported by social theories. On top of that, this study appears to be one of the few attempts worldwide in utilizing an interactive multimedia in health education on TPU prevention. Therefore, this study may provide a useful stepping stone for further research in using software mediated strategies in health education.

The product of this study, the rigorously developed interactive multimedia tobacco use prevention strategy, could provide an adjunct integration into the current primary school curriculum in Malaysia. It may help in delivering a more effective health education to the adolescents that advocates self-directed, individually paced and integrative learning. Hence, it would benefit the Ministry of Education and Ministry of Health in educating the adolescents.

Moreover, this study produces a health education material which is openly accessible to everybody including the adolescents, parents and community. It also would ensure sustainability owing to its feasibility to be published online. TUPY integrates adolescents' view in its development while using information technology as the delivery mediator. This new effort can hence be a paradigm shift in health education among the adolescents. It also is a move to incorporate adolescents' view into the education system. Thus, it is certainly a way to step forward in tailoring health education into the needs of the current era.

1.11 Conclusion

This is a mixed methodology study which aims to develop an interactive multimedia strategy for tobacco use prevention for the primary school children in Malaysia (TUPY-S). The adolescents' perspective explored in a qualitative study was used into its development supported by social theories including the Health Belief Model (Rosenstock, 1990), the Theory of Planned Behavior (Ajzen, 1991), and the Social Learning Theory (Bandura, 1977). The effectiveness of TUPY-S was evaluated in a two-armed quasi-experimental study among those at risk for using tobacco products, looking at the change in knowledge, attitude, intention to use and refusal self-efficacy at pre- and

post- interventions (1- and 8-week). Tobacco Use Prevention for the Young Questionnaire (TUPY-Q) which composed of knowledge, attitude, intention to use and refusal self-efficacy was developed to evaluate the effectiveness of TUPY-S. This study is divided into seven chapters; (1) Introduction, (2) Literature review, (3) Research methodology, (4) Phase I: pre-development, (5) Phase 2: the development, validation and reliability of TUPY-S, (6) Phase-II: Evaluation of the effectiveness of TUPY-S, and (7) Discussion and conclusion. The overall conceptual framework is illustrated in Figure 1. 1.

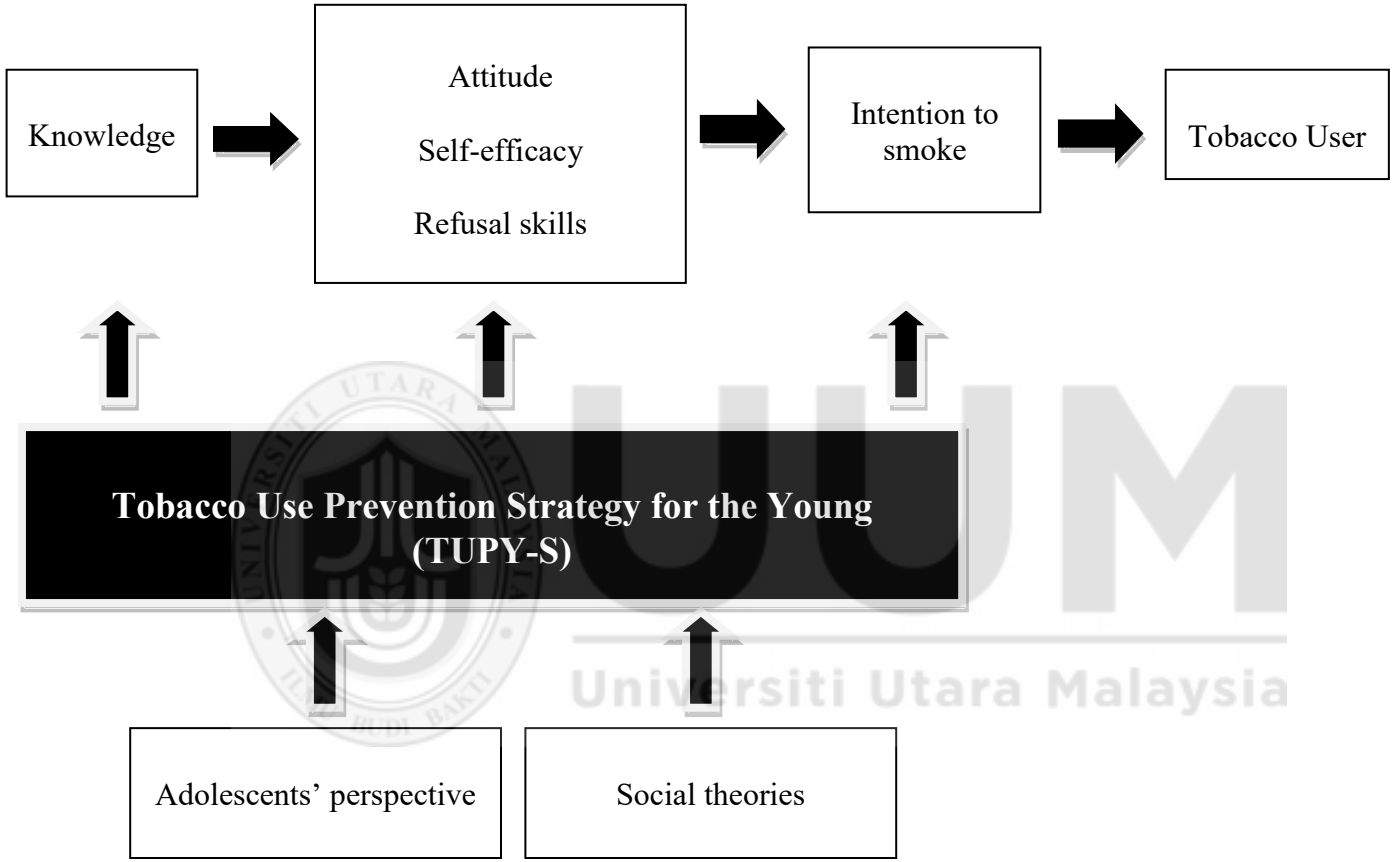

Figure 1.1. Conceptual framework of the study

CHAPTER TWO

LITERATURE REVIEW

Tobacco use and its prevention strategies have been a major topic in research since the report on its health hazards in the 1600's (Randall, 1999). On the other hand, the consumption of tobacco products continues despite the ongoing evidences against its use, especially among the adolescents. This chapter elaborates the relevant issues in the context of tobacco history, tobacco use epidemics, adolescents' development, statistical data on tobacco use among adolescents, smoking behavior, consequences of tobacco use in health and psychosocial aspects, rigorously developed tobacco use preventive strategies, social theories used in previous strategies, theories used in this study and the use of information technology in education and preventive strategies.

2.1 History of tobacco use and its prevention strategies

The existence of tobacco product began with a positive intention a long time ago. Its use, however, has turned into a worrisome addiction primarily after manipulation by money-making tobacco companies. The social norms created by its existence have been catalyzed by the biological addictive nature of its substance making the prevention strategies combating its use seem a tiresome challenge.

In 6000 B.C., tobacco plants grew natively in America (Randall, 1999). A few millenniums later, the natives began using tobacco for medicinal and religious rituals. At the end of 1400, this addictive plant travelled to Europe as a gift from the American Indians. However, the addictive nature was only recognized in the 1600s by Sir Francis Bacon when he noted profound difficulty to stop tobacco consumption. Concurrently, he

observed the development of nose and mouth cancers among the renowned users. Despite the negative consequences established, the money generating industry continued to promote tobacco use until it was considered “as good as gold” due to the increasing demand which was obviously derived from the addictive nature of the substance. Nevertheless, the state of Massachusetts pioneered efforts against tobacco use during this era by advocating the ban of public use.

Despite the continuous efforts to sustain this multi-million dollars industry by the tobacco companies, counter-measures continues to grow. More states followed Massachusetts by proposing a total ban on tobacco. In 1971, television ads for cigarettes were prohibited in America. In the 1980s, there were more smoke free zones inaugurated and smoke free flights were created. Hence, tobacco companies shifted their focus outside the US to maintain the market especially to the developing countries in Asia (Randall, 1999).

2.2 Tobacco use among adolescents

In the last decade, WHO, together with many other national health agencies throughout the world has formed a massive union involving near 200 countries calling for an act against tobacco use among youths, including Malaysia (Warren et al., 2000). The increment in the number of youths using tobacco and earlier age of initiation in developing countries despite decrement of prevalence in developed countries is a concern to the health industry. Owing to the limited known facts on this matter, the Tobacco Free Initiative (TFI), a branch in WHO, initiated Global Youth Tobacco Survey (GYTS) as a medium to collect statistical data from all WHO regions through a standard approach (WHO, 2003), as an important part of the global tobacco surveillance system.

Over two million students aged 13 to 15 years old participated in the 2010 GYTS survey. Globally, 16% of boys used tobacco compared to only 6% among girls. For smokeless tobacco products, globally, 8% of boys and 6% of girls consume smokeless tobacco. Smokeless tobacco products include chewable, snuffed and dissolvable products. In the last decade, the prevalence of teenage smoking in developed countries, such as the United States, England, and Australia, has decreased. The prevalence, however, has remained stable for the past few years (Centers for Disease Control & Prevention, 2012b). Moreover, Centers for Disease Control (2012b) also reported an increment in susceptibility to initiate smoking during the next year by 19.1%.

The problem of youth smoking continues to be a concern for Malaysians as it has become more prevalent and involves the very young (WHO, 2013). Local epidemiological studies on the prevalence of smoking among adolescents reported percentages between 14% to 37% (Kin & Lian, 2008; Lee, Paul, Kam, & Jagmohni, 2005; K. Lim et al., 2006; K. Lim et al., 2010; Santhna, Khalid, Selamat, Ho, & Mat, 2013). Twenty percent of women reported to have ever smoked in a study by Kin and Lian (2008) among 3064 women, aged between 13 and 25 years, from Kuala Lumpur and Hulu Langat in Selangor participated in the study. Slightly higher prevalence (29.7%) was reported by Lim et al. (2006) among 16-year-old students in the district of Kota Tinggi, Johor. Cross-sectional methodology with two-staged stratified sampling was utilized yielding 380 samples from 4522 population (K. Lim et al., 2006). In a similar study repeated by the same researcher among 16-year-old students in the District of Petaling, Selangor, a lower prevalence (22.3%) was reported (K. Lim et al., 2010). Alarmingly, these findings are similar to

adults as reported in the National Health and Morbidity Survey whereby 21% of the Malaysian population were smokers in 2015 (IPH, 2015).

In 2016, the results of a more recent survey on tobacco and cigarette use among the adolescents in Malaysia (TECMA) were reported (Institute of Public Health, 2016). Forteen percent of adolescents were found to be current tobacco users with 11.7% were current cigarette users. Among those aged 13 to 15 years, a slightly lower prevalence was reported in comparison with the GYTS 2009. Majority of the cigarette users started tried their first cigarette before the age of 14 at 78.7%. On the other hand, a lower prevalence was reported for current e-cigarette or vape use at 9.1% with higher prevalence found among males. Almost half of the users tried their first e-cigarette or vape before the age of 14. On top of that, the prevalence of current shisha smokers was reported at 3.5% with 51.2% tried their first shisha before the age of 14.

A survey in the US on trends in the prevalence of tobacco use (1991 to 2011), the National Youth Risk Behavior Survey, is conducted every two years and provides data among 9th to 12th grade students. The main objective of this survey is to monitor health risk behaviors which contribute to social problems, disability and death. According to this survey, the use of smoked and alternative tobacco products has declined during the first half of the survey period but remains at plateau in the second half (Chang, Lee, & Cheah, 2012). These findings are similar to the Global Youth Tobacco Survey in Malaysia (WHO, 2013).

In terms of the age of smoking initiation, epidemiological studies showed that, almost all smokers started to smoke during their youth. Local studies in Malaysia shows age of

initiation between 11 to 14 years old (K. Lim et al., 2010; Lipperman-Kreda et al., 2014). Similar findings were also reported in many other similar studies around the world. Approximately 80% of tobacco users initiate the behavior before the age of 18 in the US (Centers for Disease Control & Prevention, 2012b).

2.3 Tobacco use behavior of adolescents

Smoking behavior in adolescents has been considered as a transition through multiple stages. The process of turning into regular or nicotine dependent smokers generally takes up to three years (Department of Health Human Services USA, 1994; McNeill, 1991; U.S. Department of Health and Human Services. 2012). The existence of such stages allows room for interventions to prevent its progression. Leventhal and Cleary in 1980s suggested that smoking behavior is a complex continuum and multiple stages that are experienced by a person prior to becoming a daily smoker (Leventhal & Cleary, 1980). Similar concept was also accepted by later researchers including Flay, D'Avernas, Best, Kersell, and Ryan (1983), and Stern, Prochaska, Velicer, and Elder (1987), whereby more sophisticated stages were proposed. Among the adolescents, a transition stage prior to becoming a chronic substance user has long been recognized which opens a window of opportunity for prevention strategies.

Consistent with the outcome of previous studies, the Centre of Disease Control (CDC) defined stages of smoking among adolescents on the basis of frequency and recency, which are never smokers, experimental smokers, intermittent smokers and regular smokers (Centre of Disease Control, 2012). *Never smokers* are those who denied ever trying cigarette. *Experimental smokers* admitted to trying cigarettes but denied smoking within the past 30 days or ever smoking regularly. *Intermittent smokers* reported smoking

between 1 and 29 out of the past 30 days. *Regular/Established smokers* reported smoking daily within the past 30 days.

In the next millennium, similar concept has been revisited and clarified by multiple researchers. Mayhew, Flay, and Mott (2000) illustrated the stages in smoking behavior as pre-contemplation, contemplation or preparatory stage, tried or initiation, experimenter, regular, and established or daily smoker. *Preparatory stage* involves formation of beliefs and attitudes about smoking. *Initiation stage* refers to experimentation with the first few cigarettes. *Experimenter* smokes irregularly, with increasing frequency. *Regular* refers to smoking on a regular basis, although still infrequent. *Established* smokers smoke daily and develop nicotine dependency.

Kremers (2002) further subdivided the *Preparatory stage* among the nonsmokers into three groups: committers, immotives, and progressives. Each group differs in their intention to smoke. *Committers* have no intention to smoke at all in the future, *immotives* has no plan to start smoking, whereas *progressives* want to smoke but not within the next six months (Kremers, 2002).

The concept of stages in smoking behavior among adolescents has been continuously applied in the development of preventive strategies among adolescents. Progression from initial stages to the latter is the key to becoming a chronic smoker. Factors that are the predictors or the associated factors should be confronted to retard the progression. Thus, the understanding on these stages and the factors influencing the progression is crucial in the effort of preventing smoking among this age group.

Studies have shown that the smoking behavior among adolescents commonly reaches a stagnant stage until adulthood (Wetter et al., 2004). Moreover, among those who becomes daily smokers in adult lives, only 9% initiated smoking after high school (Chassin et al., 1991). Thus, adolescence is indeed an age of opportunity for effective prevention interventions.

2.4 Effects of tobacco use on adolescents

The impact of tobacco use does not involve the physical health alone but also includes the psychological and social aspect of one's life. Nicotine is the addictive substance found in tobacco. Apart from nicotine, according to Centers of Disease Control and Prevention (CDC), tobacco smokes contain more than 7000 deadly chemicals with hundreds of toxic chemicals and about 70 are carcinogenic (Surgeon's General Report, 2010). Examples of cancer-causing chemicals include formaldehyde which is used to preserve dead body and radioactive polonium 210. Toxic metals include arsenic which is found in pesticides and cadmium used in batteries. Poison gases include carbon monoxide which is normally found in car exhausts and ammonia, a substance in household detergents. Due to the vast information on dangers of tobacco, this section will focus on its effect specifically on adolescents.

Tobacco use is one of the major causes of premature death and disease in the world (WHO, 2003). The World Health Organization (WHO) reported approximately 5 million deaths a year secondary to tobacco use. The number is expected to exceed 10 million deaths by 2020, with approximately 70% of these deaths occurring in developing countries (WHO, 2003).

2.4.1 Tobacco and physical health among adolescents

The short-term health consequences of tobacco use include respiratory and non-respiratory effects. Lung function is greatly reduced among smokers compared to non-smokers. Moreover, smoking tobacco reduces the rate of lung growth (U.S. Department of Health and Human Services, 2012). Teenage tobacco users suffer from shortness of breath almost three times as often as teens who do not smoke and produce phlegm more than twice as often as teens who do not smoke (Arday et al., 1995). The overall physical fitness is also markedly reduced in both performance and endurance with significantly faster resting heart rate (Higgins, Gaul, Gibbons, & Van Gyn, 2003).

Moreover, they will also have significant risk of developing long term health consequences earlier than those who started using tobacco later in life such as heart disease, stroke and lung cancer (US Department of Health and Human Services, 2014). On average, someone who smokes a pack or more of cigarettes each day lives seven years less than someone who never smoked (Lew & Garfinkel, 1987).

Biologically, smoking is an addiction owing to its active addictive ingredient, which is nicotine (Kessler et al., 1997; US Department of Health Human Services, 2014). The addicts develop dependence towards this substance whereby their body will develop physical and psychological withdrawal symptoms in its absence. Eventually, an addict will develop tolerance, which forces the person to consume larger and larger doses of the substance to produce the same satisfaction (Eysenck et al., 1979). These biological impacts lead to the process of smoking cessation becomes a challenging task. As a result, most young people who smoke regularly continue to smoke throughout adulthood (Fidler et al., 2006; US Department of Health Human Services, 2014).

2.4.2 Tobacco and psycho-social health among adolescents

Tobacco use is also a psychological disease. An important reason behind such an early age of initiation is as a coping mechanism against stress which leads to the impairment of mood control, cognition, social and emotional skills (Shonkoff et al., 2012). Teenage tobacco users are more likely to have sought professional help for an emotional or psychological complaint (Arday et al., 1995). Other coping mechanisms which have been adopted by youths include alcohol consumption and illicit drugs (Shonkoff et al., 2012). Addiction to nicotine has long been found to be associated with another drug use. Tobacco use is proven to be related to the use of alcohol, heroine, and other substances which eventually lead to substantial significant misconduct (Akers et al., 1979; Jessor, 1991). CDC reported, among teens who use tobacco products, the risk of using alcohol increases by three times, marijuana by eight times, and cocaine by 22 times (US Department of Health Human Services, 2014). Tobacco use is also associated with other high-risk behaviors such as delinquencies and unprotected multi-partner sexual activities (Centre of Disease Control, 2012).

Moreover, tobacco use is a social phenomenon. The long existence of tobacco in the culture produces a normalization of smoking (Bandura, 1986). This factor is especially true among the children born into a family with smokers. Social modeling by the parents and peers has been proven persistently as the main culprit in the introduction of tobacco to youngsters (Collins & Ellickson, 2004; Fidler et al., 2006; Griesbach et al., 2003).

2.5 Youth tobacco use prevention strategies

Tobacco use has long been recognized as a major social problem among the adolescents. Prevention of smoking has become a major industry and treated in the literature similarly

to drugs addiction. Multiple prevention strategies have been developed globally at macro and micro levels.

Asia is the largest continent in the world in both, area and population, constituting nearly one-third of the landmass of the planet Earth (World Atlas, 2015). There are over 50 countries in this region which are distributed into 5 areas including the Eastern Asia, Northern Asia, South Central Asia, South East Asia, Western Asia and Middle East. Hill (1984) described South East Asia as a complex cultural mosaic owing to its colonial history and cultural diversity. Geographically, it is an intermediate zone between China and India with 10 countries including Myanmar, Thailand, Laos, Cambodia, Vietnam, Malaysia, Singapore, Brunei, Indonesia and Philippines.

To date, there is only one review published on tobacco use prevention program in Asian countries, which is by Shek and Yu in 2011. They reviewed all available published literature on smoking prevention programs developed in Asian countries or developed in other areas but implemented in Asia during the period of 1990 to 2010. The most significant observation related to tobacco use prevention was the number of rigorously designed and validated programs in Asian communities was extremely low compared to Western societies (Shek & Yu, 2011). Other findings include comparatively more programs addressing substance abuse than other mental health problems, most were preventive programs and there were very few rigorously designed evaluative studies of prevention and positive youth development programs over a long period of time.

Prevention programs for tobacco use aim to prevent initiation among those who had never used and prevent progression among those who have tried (Department of Health

and Human Services USA, 1994; Johnston, Liberato, & Thomas, 2012). Since most of smoking adolescents initiate smoking during secondary schools, preventive strategies should start well before the vulnerable period. Hence, age between 10 and 12 years old have been said to be the ideal period age for preventive measures (Ausems et al., 2002).

In reviewing the previous strategies in tobacco use prevention, literature search was performed through the Google Scholar, PubMed, EbscoHost, Cochrane Library, Scopus and Science Direct databases for studies that described the effectiveness of tobacco use prevention strategies among the adolescents. Inclusion criteria of the articles reviewed were;

1. Published from the year 2000 onwards
2. Available in full text version
3. Written in English language

The search yielded 33 relevant articles with the earliest study done in 2001 by Kuomi et al., and the latest study was done in 2017 by Nordin et al. The general overview of the studies is divided according to methods of delivery in three consecutive tables (Table 2.1 - 2.3) and discussed with regards to four aspects which are;

i. Research design
ii. The intervention: content, duration and instructors
iii. Outcomes measured and results

2.5.1 Research designs

Generally, there are two categories of research designs: experimental and non-experimental. Experimental designs can be further divided into true-experimental and quasi-experimental.

The experimental designs are especially for evaluating the effectiveness of an intervention on performance. Respondents are randomly assigned into equivalent groups in true-experimental whereas the nature of respondents is prioritized in quasi-experimental (Chua, 2012). Thus, the true-experimental design is superior in terms of ensuring that the change of a performance is solely due to the intervention. However, the quasi-experimental allows a research to be conducted among participants with specific criteria. The experimental studies could be single- or multiple-armed. The only drawback in single-armed intervention studies is the lack of control group. Hence, the claiming the outcomes are caused solely by the intervention are disputable.

Among the studies on the effectiveness of tobacco use prevention programs in this millennium, 17 (53.1%) of them were true-experimental in design, and 8 (25%) were quasi-experimental with control group. 7 (21.9%) were single-armed intervention studies. Schools were randomized in most studies, whereas classes were randomized in Brinker et al. (2017). Only 4 (12.5%) studies were done in South Asian countries, and none of them used information technology exclusively in delivery of strategy. These facts showed that, the availability of rigorously developed tobacco use prevention strategies in the South Asian region is still scarce.

Clearly, the biggest limitation of those studies was in sampling of study subjects whereby a majority sampled the schools or classes instead of the participants. Although this sampling method seems to be convenient to the researcher, it led to selection bias due to unequal level of intelligence and social exposure among the groups. This act may lead to inaccuracy of outcomes measured.

In terms of the duration of the measurement outcome, the longest follow up duration was three years (Vartiainen et al., 2007) , and the shortest follow up duration for measurement of outcomes was immediately after the intervention completed (Chen et al., 2006; Handayani et al., 2015; U. G. Lee, 2012; Nordin et al., 2017; Park, 2017; Resnicow et al., 2008; Shegog et al., 2005; T. M. Smith et al., 2008; Sumartono et al., 2012). Although longer follow up duration seems to be ideal, studies with more than one year follow up failed to show significant improvement in attitude (Cremers et al., 2015), intention to use (Krist et al., 2016; Perry et al., 2009) and smoking behavior (Campbell et al., 2008; Cremers et al., 2015; Vartiainen et al., 2007). Reasons behind these negative findings could be the inability to sustain attitude over a prolonged period due to continuous external influences among the adolescents.

2.5.2 The interventions

Almost half of the interventions (n=15) were developed from social theories and models. Among those used include the Attitude Social Influence Self-efficacy model, Social Cognitive Theory, Trans theoretical Model of Change, I-change model, Theory of Planned Behavior, Social Influence Theoretical Framework, Self-efficacy Theory, Media literacy Theoretical Framework, Social Inoculation Theory, and Social Learning Theory. The details of each theory will be discussed in Section 2.9. Previous strategies were adapted in 13 (40.6%) of the studies, while 10 (31.3%) were developed by the experts, educators and policy makers. Adolescents perspective in the development were considered in Koumi and Tsiantis (2001) and de Jong et al. (2014) in the development of the material.

Thirty (93.8%) of the interventions were done in schools except for Park et al. (2017) and Bowen et al. whereby both interventions were conducted in youth camps. School based

smoking prevention programs is one of the most effective strategies in preventing tobacco use among the youths (Gingiss, Roberts-Gray, & Boerm, 2006). Some of the studies added school level interventions (Bate et al., 2009; Lee et al., 2007; Wen et al., 2010). Interventions at school level include school posters and postcards with messages (Bate et al., 2009). Twenty-nine (90.6%) of the interventions involved multiple sessions of activities. Only two were delivered in one session among the studies exclusively using IT (Brinker et al., 2017 & Shegog et al., 2007), and one was delivered conventionally. Number of sessions varies from one session (Shegog et al., 2005) to repeated sessions with prompts over two years (Cremers et al., 2015). Duration of sessions varied from minutes to hours.

All interventions delivered using IT were self-directed or using minimal assistant specifically in setting up the sessions (Brinker et al., 2017; Park, 2017). Among those delivered using both IT and conventional approach or the latter alone, either teachers (Handayani et al., 2015; Kolovelonis et al., 2016; Lee et al., 2007; U. G. Lee, 2012; Resnicow et al., 2008; Tahlil, Woodman, et al., 2013; Vartiainen et al., 2007), peers (Campbell et al., 2008; Koumi & Tsiantis, 2001; Mohammed et al., 2016; Stigler et al., 2007), trained instructors (Handayani et al., 2015; Krist et al., 2016; T. M. Smith et al., 2008; Verma et al., 2015) or the health educators (Chou et al., 2006) were involved. The lowest number of participants (n=21) were found in a single-armed intervention study by Park et al. (2017) which was conducted in a youth camp. All remaining studies include from 100 (Handayani et al., 2015) to more than 10,000 participants (Campbell et al., 2008).

In conclusion, among the interventions delivered using IT and conventionally, and exclusively conventionally, majority of the interventions involved training the instructors to conduct the study, administered in classrooms and required multiple sessions. On the other hand, those delivered exclusively using IT were more self-directive. Hence, the former nature of the interventions is obviously time consuming and labor intensive.

2.5.3 Outcomes measured and results

The main outcomes measured in the intervention studies evaluating tobacco use prevention strategies include knowledge (31.2%), attitude (46.9%), intention to use (53.1%), refusal/self-efficacy (28.1%), and smoking behavior (34.4%) (Table 2.1 to 2.3). The items in smoking behavior composed of number of cigarette use, initiation and percentage of usage. Other less commonly measured outcomes measured were intention to help others, perceived social norm, perceived behavior control, and perceived harm. All of them were questionnaire-based assessments and analyzed quantitatively.

Significant improvements in knowledge were seen in nine (90%) studies assessing impact of their intervention on tobacco related knowledge. A quasi-experimental study by Nordin et al. (2017) found non-statistically significant improvement in knowledge. The most apparent reason was the much smaller sample size (n=120). The younger age of population involved, 10 to 12 years old, could have also contributing to the insignificant outcome.

Among the studies assessing the effects of intervention in changing attitude, 11(68%) showed statistically significant results. In the remaining five (32%) of studies, non-statistically significant improvement in attitude was observed. Among the possible

explanation on the latter were relatively younger aged participants 10 to 12 years old, in Cremers et al. (2015) and Ausems et al. (2002), and single session intervention by de Graaf et al. (2017).

In terms of future intention to use, less than half (47%) showed statistically significant reduction in the outcome score at multiple stage of time, specifically those with shorter follow-up evaluation period of immediately after prevention up to one month (Bowen et al., 2012; Lee et al., 2007; Park, 2017; Shegog et al., 2005; Stigler et al., 2007). Those with longer follow-up of six months or more tend to show reduction in non-statistical manner (Ausems et al., 2002; Bate et al., 2009; Koumi & Tsiantis, 2001; Mohammed et al., 2016; Perry et al., 2009). Possible reasons could be most of these studies assessed the outcomes after the interventions have ended, and the existing external influences are much stronger than the effects of these intervention. Hence, lower intention was difficult to be sustained.

Although behavior was considered as the second most commonly used outcome in previous studies, using this item in prevention interventions is hardly appropriate as it defeats the purpose of "prevention". As mentioned in Section 1.5, the conceptual definition for prevention is an act to protect, promote, and maintain health and well-being and prevent disease, disability, and premature death (Viera & Power, 2012).

Table 2.1

General Overview of Tobacco Use Prevention Strategies Delivered Exclusively Using Informational Technology

No	Source	Study design	Population	Development	Delivery	Control	Outcomes	Results
1.	Park 2017 USA	Single armed Baseline Im. post	10-14 years old N=21	Social theory & adapted from previous program. Adolescence assists in developing material	Video eight twice-weekly sessions	Not applicable	Intention	Reduced**
2.	Brinker 2017 Germany	RCT Baseline 6 months 12 months	11-15 Year old N = 718	EAT intervention (Photoaging) Experts	Medical student-led interactive modules (120 mins)	Same schools (no intervention)	Behavior	Reduced*
3.	Nadasan 2016 Hungary	RCT Baseline 6 months	14.9 years old N=1369	Social Cognitive Theory & TTM Adapted program.	Web-based "ASPIRA" 5 sessions	No intervention	Initiation	Less likely*
4.	Cremers 2015 Holand	RCT Baseline 12 months 25 months	10-12 years old N=3213	Adapted from previous program	Web-based Prompt, no-prompt and the Fun without smoke" Over 2 years	No intervention	Attitude Initiation	Improved* Reduced*

Table 2.1 continued

5.	Rath 2015 USA	Single-armed Baseline 1wk1&3mth	13-24 years old N=2623	Not specified	Video games	Not applicable	Attitude Intention	Improved** Reduced*
6.	deJong 2014 Holand	RCT Baseline 6 months	13.7 years old N= 4979	I-Change Model Integrated Model Adolescents reviewed	Computer tailored Program "Smoke alert".	No intervention	Initiation	Higher in control group*
7.	Bowen 2012 USA	RCT Baseline 1 month	12–18 years N=226	Adapted from previous program.	Web-based 1 hour per day for 6 weeks	No intervention	Attitude Intention	Improved** Reduced**
8.	Buller 2008 USA vs Aus	RCT Baseline Post-testing (time varies)	Grade 6-9 US: N=1234 Aus: N=2077	Social cognitive theory	Web-based 45 to 60 minutes x 6 sessions	No intervention	Intention Prevalence	Reduced* Reduced*
9.	Shegog 2005 USA	Single-armed Baseline Im. post	10-12 years old N= 2227	Experts	Web-based A single class lesson (20 to 50 minutes)	Not applicable	Knowledge Attitude Intention Refusal self-efficacy	Improved** Improved** Reduced** Improved**

* $p > 0.05$
** $p < 0.05$

Table 2.2

General Overview of Tobacco Use Prevention Strategies Delivered Using Both Informational Technology and Conventional Methods

No.	Source	Study design	Population	Development	Delivery	Control	Outcomes	Results
1.	Turhan 2017 Holand	Quasi-exp Baseline Im. post	12 to 16 years old N=353	ASE model	Audiovisual Drawings Discussion 8 sessions (50mins)	No intervention	Perceived social norm Intention Refusal self-efficacy	Improved* Reduced* Improved*
2.	Muhammad 2016 Saudi	RCT Baseline 6 months	13.9 years old N = 1381	I-change model Adapted from previous program	Peer led Video, group work, 45mins x 5 sessions	No intervention	Attitude Intention Resilient	Improved ** Lowered* Higher*
3.	Verma 2015 India	Single-armed Baseline 1 week	15 to 16 years old N=720	Social influence theoretical framework	Facilitator PowerPoint Audiovisual 2 sessions over 6 months	Not applicable	Knowledge Attitude Intention Behavior	Improved ** Improved ** Reduced** Reduced**
4.	Ghrayeb 2013 Pakistan	RCT 2 armed Baseline 3 months	16 to 18 years old N=240	Experts	Power Point Printed materials 45min x 5 sessions over 2 months	No intervention	Knowledge	Improved**

Table 2.2 continued

5.	Sumartono 2012 Indonesia	Quasi-exp Baseline Post	14.6 years old	Experts	Discussion Video 1-hour x 2 sessions	No intervention	Intention	Reduced*
6.	Norman 2008 Canada	RCT Baseline Im. post 3 months 6 months	Grades 9-11 N=1,402	STAR spiral technology	Website Discussion Initial 20min website. 10min discussion Monthly emails	No intervention	Intention Refusal self-efficacy Cigarette use	Reduced** Improved** Reduced**
7.	Auseum 2002/2004 USA	RCT 4 groups Baseline 6 months	11 to 12year-old N=3,349	Social inoculation theory	7-lesson 3-computer-tailored letters	No intervention	Attitude Intention Refusal self-efficacy	Improved* Reduced* Improved*
8.	Kuomi 2001 Greek	Quasi-exp Baseline Im. post 3 months	13.4 years old N=217	Social influenced approach	Peer-led Audiovisual Drawing Discussion	No intervention	Knowledge Attitude Intention Behavior	Improved** Improved** Reduced * Reduced*

* $p > 0.05$
** $p < 0.05$

Table 2.3

General Overview of Tobacco Use Prevention Strategies Delivered Exclusively Using Conventional Methods

No	Source	Study design	Population	Intervention	Control	Delivery	Outcomes	Results
1.	de Graaf 2017 Holand	Quasi-exp Baseline Week-4	13-16 years old N=256	Narrative Adapted from previous program	Informational	Education booklet 40 minutes x 1 session	Attitude Intention Beliefs	Improved* Reduced* Improved*
2.	Nordin 2017 Malaysia	Quasi-exp Baseline Im.post	10-12 years old N=120	IPoPS Adapted from previous program	No intervention	9 hours in 3 days	Knowledge	Improved*
3.	Kolovelonis 2016 Greek	Single-armed Baseline Im. post	11 and 14 years old N=238	Theory of planned behavior	Not applicable	Teachers 8 sessions weekly	Knowledge Attitude Perceived behavior control	Improved** Improved** Improved*
4.	Krist 2016 Germany	RCT 3 armed Baseline 12 months 24 months	13 years old	Experts Student intervention Parent-student intervention	Nutrition and health	Trained moderators 6 stations and an informative billboard	Initiation	Reduced*

Table 2.3 continued

5.	Handayani 2015 Indonesia	Quasi-experimental Baseline Im. post	13-14 years old N=100	Self-efficacy theory	No intervention	Teachers and facilitator 1-hour x 8 sessions over 4 weeks	Self-efficacy	Improved**
6.	Tahlil 2013, 2015 Indonesia	RCT 4 armed Baseline 1 week 6 months	11-14 years old N=477	Teachers and policy makers (quali) Health based Islamic based Combined	No intervention	Teachers 8 sessions over 2 months	Knowledge Attitude Intention Behavior(1week) Behavior (6months)	Improved** Improved** Reduced* Reduced* Reduced** (Islamic)
7.	Lee 2012	Single armed Baseline Im. post	Grades 6-8 N=500	Media literacy theoretical framework	Not applicable	Teachers 14 sessions in 1 year	Attitude	Improved**
8.	India Stigler (2007) Bate (2008) Perry (2009)	RCT Baseline Interm.post Baseline 1 year Baseline 2 years	11-14 years old N=8369	Social cognitive theory	Control	MYTRI Peer-led +Parents' intervention Curriculum Posters Postcards	Knowledge Intention to use Refusal self-efficacy Intention to use Intention to use	Improved** Reduced** Improved** Reduced* Reduced*

Table 2.3 continued

9.	Resnicow 2008 South Africa	RCT 3-armed Baseline Im.post	14 years old N=4684	Adapted from previous program Harm minimization curriculum	Life skills training	Teachers 8 sessions over 3 months	Attitudes Refusal skills Behavior Perceived harm	Improved* Improved* Reduced* Improved*
10.	Campbell 2008 England and Wales	RCT Baseline Im.post 1&2 years	12–13 years old N=10,600	Not specified "ASSIST"	No intervention	Peer-led	Smoking rate	Reduced** (1 year) Reduced* (2 years)
11.	Smith 2008 USA	Single-armed Baseline Im. post	10-15 years old N=816	Experts ToPIC	Not applicable	University students 3 sessions (30-40mins) weekly	Knowledge	Improved**
12.	Vartiainen, 2007 Finland	RCT Baseline Year-1, 2, 3	13.8 years old N=2745	Attitude, social influence and efficacy model	Health education curriculum.	Teachers Over 3 years	Behavior	Improved*
13.	Lee 2007 Taiwan	Quasi-experimental Baseline Week-1	12-14 years old N=469	Experts No smoking and smoking prevention strategy	No smoking strategy	Teachers 6 sessions (45min)	Knowledge Attitude Intention Self-efficacy	Improved** Improved** Reduced** Improved**

Table 2.3 continued

14.	Chou 2006 Wuhan, China	RCT Baseline Year-1	7th grade N=2661	Adapted from previous program	Normal activities	Health educators 13x45-min (1 lesson/week)	Behavior (effective among boys)	Reduce*
15.	Chen 2006 SAFT	Quasi-experimental 3 armed Baseline Im. post	14 years old N= 381	Adapted from previous program Experts	No intervention	7 sessions x 45 min over 2 months	Attitude Refusal self-efficacy Behavior Perceived negative mental health consequence	Improved* Improved** Reduced* Improved**

* $p > 0.05$
**$p < 0.05$

2.6 Using information technology in education

Using information technology in education has become increasingly popular around the world in line with the introduction of the "Digital Era". Although the term "Digital Era" seems self-explanatory, the actual explanation behind these two words is still very lacking (Shepherd, 2004). According Shepherd (2004), technology is the main ingredient in this era, which speeds up knowledge turnover and widens its scope within a society or economy. The theory of evolution states that sustainability of a system relies on the knowledge turnover. Faster turnover of knowledge is desirable as it leads to change in the environment through adaptation of the new knowledge into the existing system leading to an ever-lasting existence. In the Digital Era, the ability of the web to adapt new knowledge into the system is beyond human control. This cyber intelligent phenomenon leads to huge implications on the social and economic status of a nation, and the existence of world without boundaries, principally on the accessibility of knowledge.

Tatnall (2015), in an editorial column, described the symbiosis between education and information technology as a worldwide phenomenon. According to the Social Learning Theory, in the process of modeling and information response transmission, behavior is better than verbal demonstration (Bandura, 1986). Furthermore, in Piaget's Theory of Development, the human mind develops through multiple stages whereby before its maturation, a stage of concrete operational stage, occurs (Piaget, 1976). The learning ability is most effective through visualization at young age (Santrock, 2012). Thus, information technology plays a significant role of developing new attitude, emotional and behavior through direct observation and demonstration in live films and televised models especially among the adolescents.

Recently, learning through games has gained increasing consideration as a valuable tool in education (Almeida, Bolaert, Dowdall, Lourenço, & Milczarski, 2015). The reasons being include its simplicity and cost effectiveness. Naturally, most people prefer playing over learning. Particularly among adolescents, owing to the shorter attention span (Santrock, 2012). Hence, in using games as a mode of learning, the boredom of learning through texts shall be uplifted.

In the current millennium, learning environment has developed into a meshwork of numerous methods in gaining knowledge. Traditionally, learning means gaining knowledge through the presence of physical materials such as textbooks, pen and paper, conducted by real-life teachers in a classroom. Nowadays, information technology has evolved the learning environment into the virtual environment with the emergence of internet assisted mediums such as teleconferencing, online learning, internet, Computer Assisted Learning (CAL), and Web-Based Distance Learning (WBDL). Nevertheless, a learning environment which integrates both ways of learning enhances the student's learning experience and outcome (Wai & Seng, 2015).

2.7 Information Technology in tobacco use prevention strategies

Most adolescents can be reached at schools making school-based classroom style program favorably utilized for many decades in the prevention strategies for tobacco use. However, with the recent emergence of information technology mediated educational strategies, there is an increasing need for the usage of sophisticated computer-assisted interventions since the late 90's (Aveyard et al., 1999; Secker-Walker, Worden, Holland, Flynn, & Detsky, 1997). The use of this technology seems to have fixed the problem of sustainability with the conventional method especially in terms of labor intensive and

time consuming. Despite these promising facts, a rigorously developed, culturally adapted, interactive program is still not available to our knowledge in the South Asian region.

Walters, Wright, and Shegog (2006) reviewed all published computer and internet-based interventions from the year of 1994 to 2004. Out of 19 studies on smoking prevention and cessation identified, only four involved the adolescents aged 11 to 16 (Ausems et al., 2002; Ausems, Mesters, Van Breukelen, & de Vries, 2004; Aveyard et al., 1999). Two of the studies reported reduction in smoking initiation significantly through sending computer-tailored material to the homes of the participants (Ausems et al., 2002, 2004). In both studies, Ausems et al. used similar intervention with three mailed letters, computer tailored to students based on beliefs, efficacy, and intent to smoke, on two separate groups in each study. The letters were sent to the participants' home at 3-week intervals. The content was developed based on the Social Inoculation Theory, the Theory of Reasoned Action, and Bandura's Social Cognitive Theory. Smoking initiation was reduced among elementary and secondary school children.

A more recent systematic review on the internet-based program for smoking prevention among the youths younger than 24 years old was done by Park and Drake (2015). Twelve studies between the years 2003 and 2013 were included in this review. Among these studies, only four included intervention for the prevention among non-smokers (Bowen et al., 2012; Buller et al., 2008; Norman et al., 2008; Shegog et al., 2005). Theoretical models were used in most of the program development, including the Social Cognitive Theory (Buller et al., 2008) and Likelihood of Action Index Theory (Bowen et al., 2012; Norman et al., 2008). Buller et al. (2008) added motivational interview technique.

Multimedia such as video content and stories were used in most studies together with interactive components (Bowen et al., 2012; Buller et al., 2008; Norman et al., 2008; Shegog et al., 2005). Some studies added non-internet components into their intervention which include in-person group discussion or motivational interview (Norman et al., 2008). In terms of the outcomes on smoking prevention programs, intention to smoke was significantly reduced in most studies (Bowen et al., 2012; Buller et al., 2008; Shegog et al., 2005).

2.8 Theoretical framework

Social phenomena can be examined by analytical frameworks or paradigms known as social theories. The term 'social theory' include ideas about the change and development of a society, social behavior, power within a social structure, ethnicity and gender, civilization, modernization, revolutions and ideal world (Harrington, 2005). Tobacco use is a social phenomenon (Corbett, 2001). Multiple theories have been able to explain the roots of this phenomenon, identifying the predictors of those at risk and the protecting factors (Collins & Ellickson, 2004; Petraitis, Flay, & Miller, 1995). These findings have opened the road to the challenging task of preventing tobacco use among adolescents.

Despite the simplicity of the theories outlaid, the best route of prevention is still vague. Attempts have been made to integrate the theories on the basis that interventions developed from one theory are weak (Collins & Ellickson, 2004). This is mainly due to the unique variance in smoking behavior. Apart from social theories which incorporates processes such as perceived approval, deviance and assumption of adult roles, factors related to addiction may also have significantly provide major contribution in smoking behavior. These factors include contextual cues, habit and mental state (Orlando,

Ellickson, & Jinnett, 2001). Thus, an integrated approach would enable a better coverage for broader spectrum of outcomes.

Tobacco use continues to be one of the major high-risk behaviors among adolescents despite enormous efforts in combating this social disease. Sensibly, multiple prevention strategies have been developed to prevent them from smoking. Although minute decrement of the prevalence has been seen, the proportion of them smoking at this young age is still significant (Bauer & Kreuter, 2015; WHO, 2013). As mentioned earlier, nearly half of the interventions (n=15), developed since year 2000, were developed from social theories and models. Among those used include the Social Cognitive Theory, Trans theoretical Model of Change, I-change model, Theory of Planned Behavior, Social Influence Theoretical Framework, Self-efficacy Theory, Media literacy Theoretical Framework, Social Inoculation Theory, and Social Learning Theory. Earlier review by Petraitis, Flay and Miller (1995) highlighted four most commonly used major theories to predict the initiation (Petraitis et al., 1995), namely, Theory of Planned Behavior (Ajzen, 1985, 1991), Social Learning Theory (Akers, 1977; Bandura, 1986), Social Attachment Theory (Elliott, Huizinga, & Ageton, 1985) and Problem Behavior Theory (Jessor & Jessor, 1977). Hence, more theories have been applied to develop tobacco use prevention strategies in this millennium.

The most important effects of tobacco use are on health of the users and those around them. Hence, the key element in tobacco use prevention strategy is health education. Social theories used in health education strategies have close resemblance to those used in previous strategies on tobacco prevention. Among listed in a review by DeBarr (2004) are Health Belief Model (Strecher & Rosenstock, 1997), Theory of Planned Behavior

(Ajzen, 1988, 1991), Social Cognitive Theory (Bandura & Walters, 1963; Bandura, 1969, 1977a, 1977b), and Transtheoretical Model (Glanz, Lewis, & Rimer, 1997; Kreuter & Lezin, 2002; Zimmerman, Olsen, Bosworth, 2000). The Health Belief Model has been claimed as the most commonly used model in health education and promotion (Hayden, 2013). Herewith, the overview of the main theories and models related to health education and tobacco use among the youth are discussed.

2.8.1 Adolescents and development

The pattern of human development composed of several processes, namely, biological, cognitive, and socio-emotional (Santrock, 2012). Biological processes involve physical and hormonal changes. Cognitive processes include thinking, intelligence and language development. Socio-emotional processes involve inter-personal relationship, emotions, and personality. It is crucial to understand the stages of educational development to ensure acceptability of an education program.

According to Piaget's Theory, the cognitive process undergoes multiple stages which are schemas, assimilation and accommodation, organization, and equilibration (Piaget, 1976). Piaget divided cognitive changes into four stages. Stage 1 (birth to 2 years old), the sensori-motor stage, involves the construction of understanding by coordinating sensory experiences (such as seeing and hearing) with motor actions (reaching and touching). In stage 2 (2 to 7 years old), the preoperational stage, there is increment in symbolic thinking together with the changes in stage 1. In stage 3 (7 to 11 years old), the concrete operational stage, logical reasoning on concrete events and ability to classify objects into different sets occur. Finally, in stage 4 (11 years onward), the formal operational stage, the reasoning ability becomes more abstract, idealistic, and logical.

The UNICEF (The United Nations Children's Fund) separates the adolescents into two groups according to their age: early adolescence (10–14 years) and late adolescence (15–19 years) (Ascencios et al., 2011). Neuro-biologically, the frontal lobe, the part of the brain that governs reasoning and decision-making, starts to develop during early adolescence. Because this development starts later and takes longer in boys, their tendency to act impulsively and to be uncritical in their thinking lasts longer than in girls. They may also feel confused about their own personality making peer-group opinions become very significant in their decision making. Thus, more boys than girls tend to involve themselves in high-risk behavior including using tobacco products.

In late adolescence (15 to 19 years), the brain continues to develop and reorganize itself, leading to enhancement in the analytical and reflective capacity (Santrock, 2012). At this stage, peer-group's opinions are important at the outset, but diminish eventually as adolescents gain more confidence and clarity in their own opinions and identity. Risk-taking attitude also declines during late adolescence, as the ability to evaluate risk and make conscious decisions develops. Nevertheless, tobacco use and experimentation with other substances often start in the earlier risk-taking phase and then continued into later adolescence and adulthood. In tobacco use for example, one in five adolescents aged 13 to 15 smokes, and around half of those who begin smoking in adolescence continue to do so for at least 15 years (Bauer & Kreuter, 2015). Among girls, profound anxieties over body image on top of cultural and media stereotypes of feminine beauty are the main contributors to the root of tobacco use (French & Perry, 1995; Kin & Lian, 2008).

2.8.2 Health Belief Model

The Health Belief Model (HBM) fulfills the need for a solid foundation in developing health preventive activities. HBM is a conceptual framework used to understand health behavior and possible reasons for non-compliance with recommended health action (Hayden, 2013; Rosenstock, 1990; V. Stretcher & Rosenstock, 1997). It provides guidelines for health program development allowing planners to understand and address reasons for non-compliance. The HBM addresses four major components which influence health behavior: 1) perceived seriousness of the disease, 2) perceived susceptibility of the disease, 3) perceived benefits of recommended health action, and finally 4) perceived barriers of recommended health action. In addition, there are modifying factors that can affect behavior compliance including age, sex, ethnicity, personality, socioeconomic factors and knowledge. On top of that, self-efficacy was later added onto the model explaining the importance of resilience in choosing a behavior. According to the Health Belief Model, the modifying variables, cues to action, and self-efficacy affect one's perception of susceptibility, seriousness, benefits, and barriers which would then influence one's behavior (Figure 2.1).

Perceived seriousness

The construct of perceived seriousness was described as an individual's judgment on the severity or seriousness of a disease. The perception is most frequently based on medical knowledge on the negative health effects of a disease on one's life (Hayden, 2013). In the context of smoking, accepting that smoking is bad for health, a person would avoid this behavior. Beside health, other effects can also be considered as an influence towards

one's perception on the seriousness of a behavior or disease such as wasting money (Rosenstock, 1974).

Perceived susceptibility

Another powerful perception which would prompt people to adopt healthier lifestyle is perceived susceptibility. This construct refers to the subjective belief on contracting a condition because of a behavior (Rosenstock, 1974). The HBM proclaimed that the perceived susceptibility has a positive correlation with one's likelihood to engage in good behavior. Hence, the greater one's perception on the negative risk associated with tobacco use, the more likely for a person to avoid behaviors related to tobacco use. Rosenstock (1974) claimed a major influence of knowledge on perceived susceptibility.

Perceived benefits

According to the HBM by Rosenstock (1974), one's action towards a behavior is influenced by one's opinion of the profit gained by the new behavior. In the context of health-related action, people are believed to develop a behavior when they believe it would reduce their chances of developing a disease. For example, in tobacco use, a person is believed to avoid using tobacco product when he believes on the benefits of not using.

Perceived barriers

On the other hand, one's belief on the health benefits of an action could be overruled by one's belief on the existence of barriers. For example, in deciding not to use tobacco product, the barriers in choosing this action include peer's pressure and the continuous availability of tobacco products. According to Rosenstock (1974), the construct of

perceived barriers explains how the negative aspects of a health action would influence a person towards the negative behavior despite the benefits perceived (Rosenstock, 1974). Since this is an individual's own evaluation of the obstacles in adopting a new behavior, perceived barriers have become the most significant construct in deciding an action in behavior (Janz & Becker, 1984).

Modifying Variables

HBM recognized other factors which could influence the above four major constructs of perception, such as personality, gender, culture and education level. These factors are mainly the individual characteristics which could modify one's perceptions. In tobacco use, for example, being male has been proven to be a strong predictor of smoking among adult and adolescents in Malaysia (H. K. Lim et al., 2013; K. Lim et al., 2006; K. Lim et al., 2010).

Cues to Action

HBM regards those factors that will initiate a person to changing a behavior as cues to action. These are external factors which could influence behavior. The factors include people, events or things. In tobacco use prevention strategy, tobacco related cancer in a family member or close friends would be a strong influence on one's decision against tobacco use. Advice from significant others and health care provider are also included under this context of HBM.

Self-Efficacy

Self-efficacy was added into HBM much later than the other constructs discussed above (Rosenstock, Strecher, & Becker, 1988). Originally, the construct of self-efficacy was

described by Bandura (1977), in the Social Cognitive Theory, as the personal belief in one's own ability to adopt a behavior or action. Rosenstock et al. (1988) recognized the noteworthy influence of this construct in deciding on an action made by a person whereby a person would not try to perform behavior unless they belief they are able to do them. In the context of tobacco use, enhancing one's belief on their incapability of using tobacco product would inhibit their desire to try using them.

The Social Cognitive Theory (SCT) described some essential components in the adoption, initiation, and maintenance of health behaviors. According to SCT, the personal sense of control allows behavioral change. One's belief in taking an action led to inclination to conduct a behavior or commitment on a decision and is also known as perceived self-efficacy. This believe in self-strength signifies one's sense of control over the environment, enables one to overcome the challenging demands by means of adaptive action. In tobacco use initiation, the concept of self-efficacy would change the way people feel, think and act. The outcome expectancies, the other key construct in social cognitive theory, are beliefs about the consequences of one's action. The sub-components include physical, social and self-evaluative outcome expectancies have been distinguished.

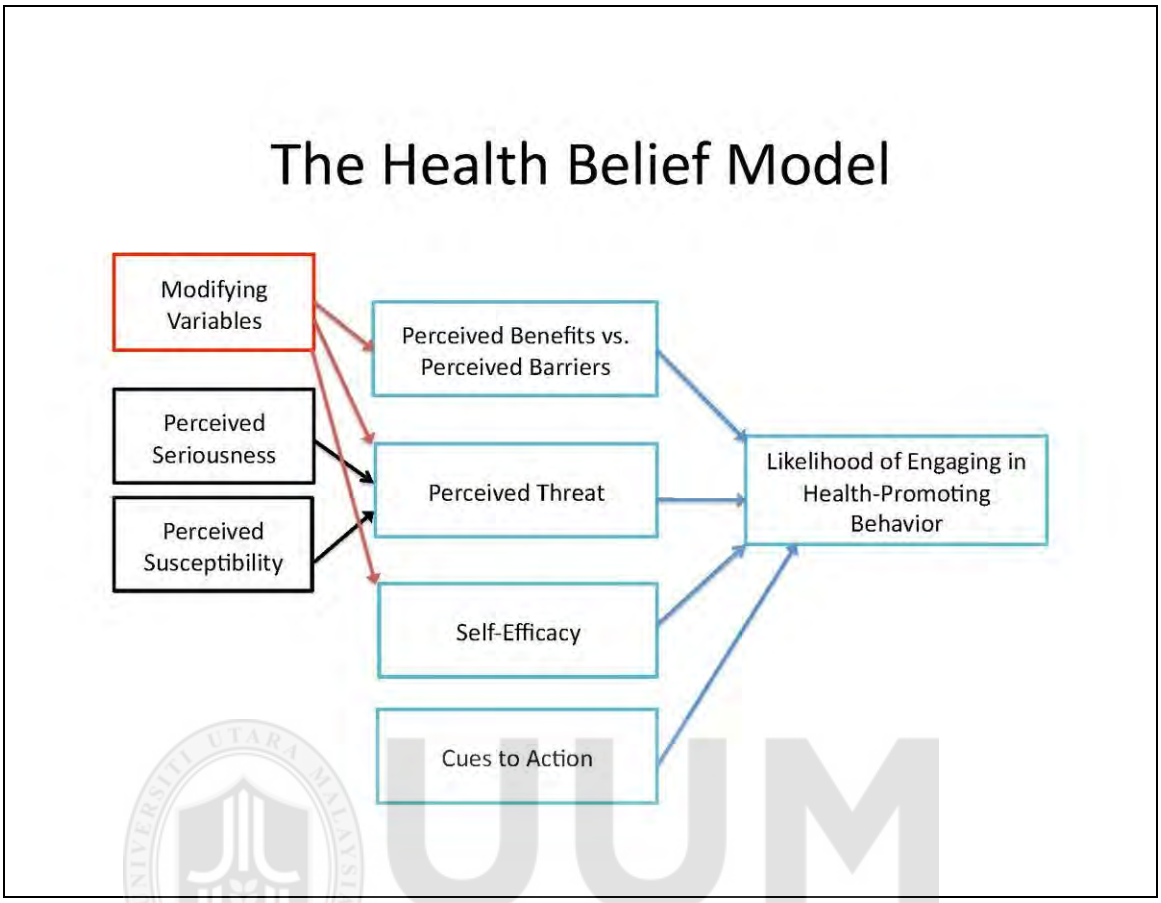

Figure 2.1. The Health Belief Model by Rosenstock, Strecher, & Becker (1988). (Available at https://en.wikipedia.org/wiki/File:The_Health_Belief_Model.pdf)

2.8.3 Theory of Planned Behavior

According to the Theory of Planned Behavior (TPB), human behavior is guided by three kinds of self-beliefs: behavioral beliefs, normative beliefs, and control beliefs (Ajzen, 1988). The behavioral beliefs involve the role of one's belief about the likely outcome of a behavior and the evaluation of these outcomes in influencing behavior leading to the formation of one's favorable and unfavorable *attitude* towards a behavior. The normative belief describes the influence of human behavior by the normative expectations of others and motivation to comply with these expectations; resulting in perceived social pressure or *subjective norm*. The control beliefs are described as the beliefs about the presence of

factors that may influence the performance of the behavior and the perceived power of these factors giving rise to *perceived behavior control* (Ajzen, 1985, 1991).

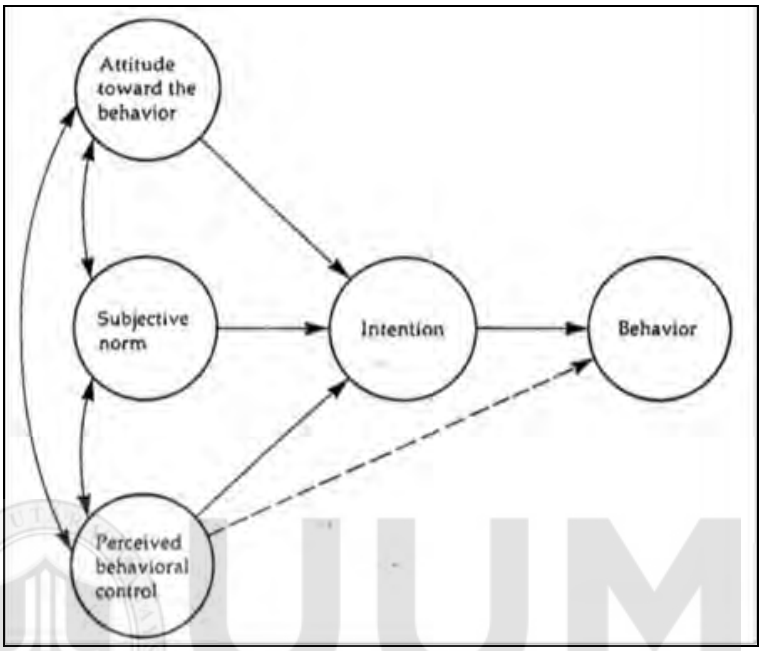

Figure 2. 2. Theory of Planned Behavior (Ajzen, 1988)

Subsequently, merging the three core concepts together, Schifter & Ajzen described the concept of self-efficacy which specifically represents the perceived ease or difficulty of performing a particular behavior (Schifter & Ajzen, 1985). According to this theory, people tend to avoid performing a behavior that they feel is beyond their ability or control even though they hold positive *attitudes* towards that behavior or expect approval from others known as *subjective norm*.

In applying the said concept to the initiation of smoking, two types of self-efficacies were identified to be the direct contributors: “use self-efficacy” and “refusal self-efficacy”. The first type represents the adolescents’ beliefs in their abilities to obtain and successfully smoke a cigarette. According to TPB, the knowledge on where to obtain cigarettes and on

the act to smoke contributes to the initiation of smoking. On the other hand, the "refusal self-efficacy" represents the adolescents' beliefs in their abilities to resist social pressure. Initially, adolescents might have no long-term plans to initiate smoking but started to experiment due to lack of skills that are necessary to refuse when faced with peer pressure. Many other recent studies revealed supportive results for this theory whereby the adolescents' beliefs in their abilities to resist pressures to smoke is a significant predictor to smoking initiation (de Vries, Dijkstra, & Kuhlman, 1988; DeVries, Kok, & Dijkstra, 1990; Kok, de Vries, Mudde, & Strecher, 1991).

2.8.4 The Social Learning Theory

The Social Learning Theory (SLT), as described by Akers (1979), proposes that a person learns to commit deviant acts through interaction with his social environment. Hence, consequences are attached to one's behavior, is reinforced if given rewards while failure to punish deviant acts leads to reinforcement of conforming behavior, and his association with others who provide him with definitions that make the deviant behavior seem more desirable (Akers, 1979). Akers has applied this theory in explaining deviant and criminal behaviors (Akers et al., 1979), along with drug use and abuse (Akers, 1992).

Bandura however described the social learning theory as a balance influences on behavior which can be stable or unstable allowing change with time and circumstances (Bandura, 1977). The principle mechanisms proposed by Bandura (1977) are differential association (direct and indirect interaction with others), differential reinforcement (instrumental learning through reward and punishers), imitation (observational learning), and cognitive definition (favorable and unfavorable attitudes).

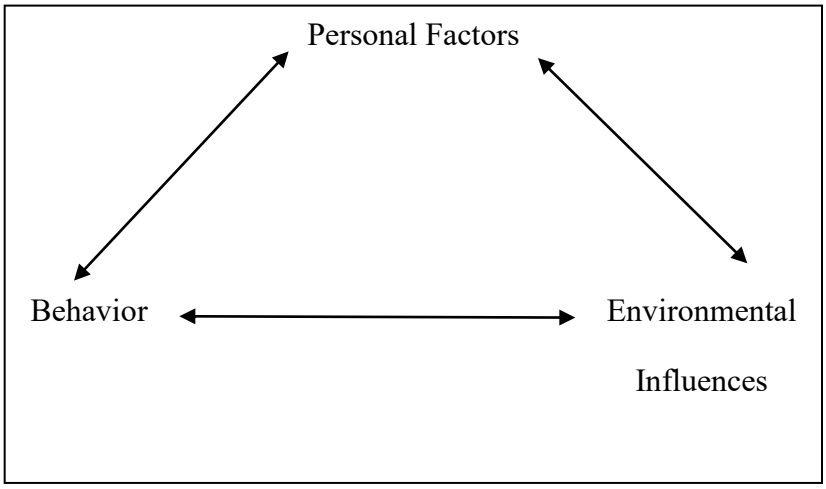

Figure 2.3. The Social Learning Theory (Akers, 1979)

Petraitis *et al.*, in integrating the Social Learning Theories by Akers (1979) and Bandura (1977) with smoking behavior, claims that in social learning models, peers and family influence smoking behavior (Petraitis et al., 1995). Social Learning theories hypothesized on the role of cognition in behavior whereby cognition originates from observing others especially close friends, parents, peers, and siblings (Akers, 1979; Bandura, 1977). Petraitis claims that observational learning is the fundamental predictor of smoking behavior. Other predictors include self-efficacy and role of past behavior. The predictors derived from these theories are how significant others, self-efficacy and prior smoking attempts play significant role in determining one's direction in smoking stages.

2.8.5 The Social Attachment Theory

Social attachment theory (SAT) as described by Elliot, Huzinga and Ageton (1985), refers to how social bonds or attachments are essential in understanding youth's high-risk

behaviors leading to the conclusion that pro socio-family and peer network is protective against tobacco use (Hawkins & Weis, 1985). On top of that, this theory also outlines that risk-taking youths are not socially isolated, but rather bonded with other deviant youth. Hence, peer network among tobacco users is a predictor towards using tobacco among youth. Petriatis, in his review on the theories of adolescents' substance use, postulated that when youths have weak social bond with peers or family, they are at higher risk of engaging in high risk behavior including smoking (Petraitis et al., 1995). The association between the predictors and the outcome is illustrated in Figure 2.4.

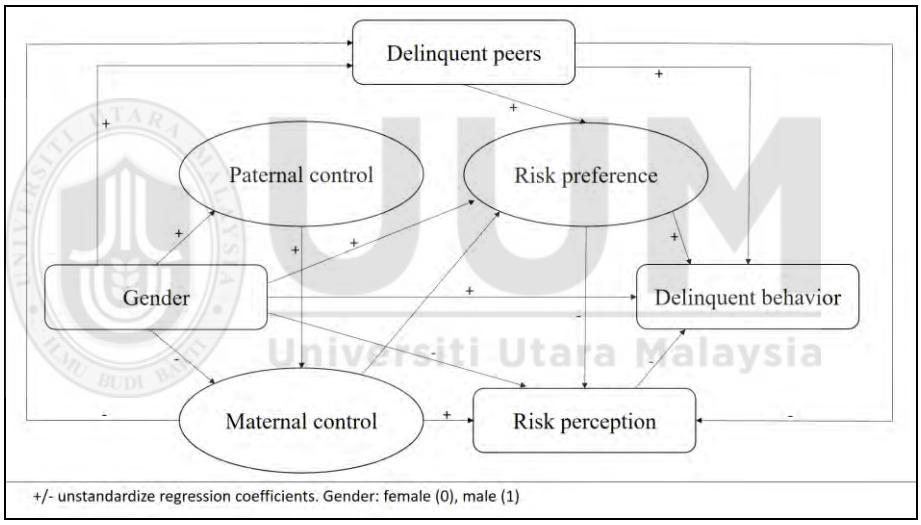

Figure 2.4 The Social Attachment Theory (Elliot, Huzinga and Ageton 1985)

2.9 Conclusion

What is needed now is an up-to-date rigorously developed strategy tailored to the current needs of the younger adolescents. This new effort can hence be a paradigm shift in the health education among the youth. It also can be seen as a move to incorporate students view into the education system. Thus, it is certainly the way to step forward in tailoring the health education into the needs of the current era. In view of the move to a different

era, the teaching method must be reviewed. Locally, the current way of tobacco use prevention strategy has a significant limitation in delivering the content whereby only two activities are included in the workshop namely "The smoker's body" aiming to educate regarding the health effects of cigarettes and the short play on "Say No to Smoking" aiming to educate on how to refuse cigarette when offered (Ministry of Health & Ministry of Education, 2012). Consequently, very limited content can be delivered conventionally.

Tobacco product use (TPU) is prevalent despite many preventive strategies executed. However, a rigorously developed tobacco use preventive strategy is still lacking in our region let alone tailored to the current generation living in Malaysia. The adolescents' perspective has yet to be taken into consideration in developing such strategy. Many social theories have been used to explain the use of substance among adolescents including tobacco through an intangible complex connection which integrates in many ways. The use of multiple social theories in explaining this phenomenon is unavoidable, since TPU is not only a medical catastrophe but more towards a social misadventure especially in the beginning of its use. However, using one theory alone seems to be inadequate as the initiation of tobacco use seems to be influences by multiple factors within oneself together with the environment. Project-TUPY aims to fulfill this salient gap to prevent TPU among the adolescents.

CHAPTER THREE

RESEARCH METHODOLOGY

The Tobacco Use Prevention Strategy for the Young project aims to develop, validate, and determine the reliability and effectiveness of an interactive multimedia tobacco use prevention module (TUPY-S), for the early adolescents living in Malaysia. This chapter reports the overall sequence of the study, research area, research design, study population and ethical considerations taken during the study.

3.1 The overall sequence of the study

TUPY-S was developed following an extensive guideline on development of modular instruction by Russell (1974) (Figure 3.1). Originally, Russel (1974) designed a basic concept of modular instruction to aid classroom teachers in improving their teaching and learning sessions towards individualized instruction. Although other guidelines have been proposed in the literature, the researcher chose the prior method due to its comprehensiveness, transparency and has been used effectively in many local research (Ahmad, Hassan, & Abidin, 2008; Jalil & Mahfar, 2016; Madihie & Noah, 2013; Nawi, Zakaria, Hashim, & REN, 2015; Zuki & Hamzah, 2014). On top of that, the guideline by Russell (1974) is able to investigate all of the objectives of this study, answer the research questions and approve the research hypotheses. The modular instruction guideline by Russell (1974) was followed in the entire process of this study (Figure 3.1).

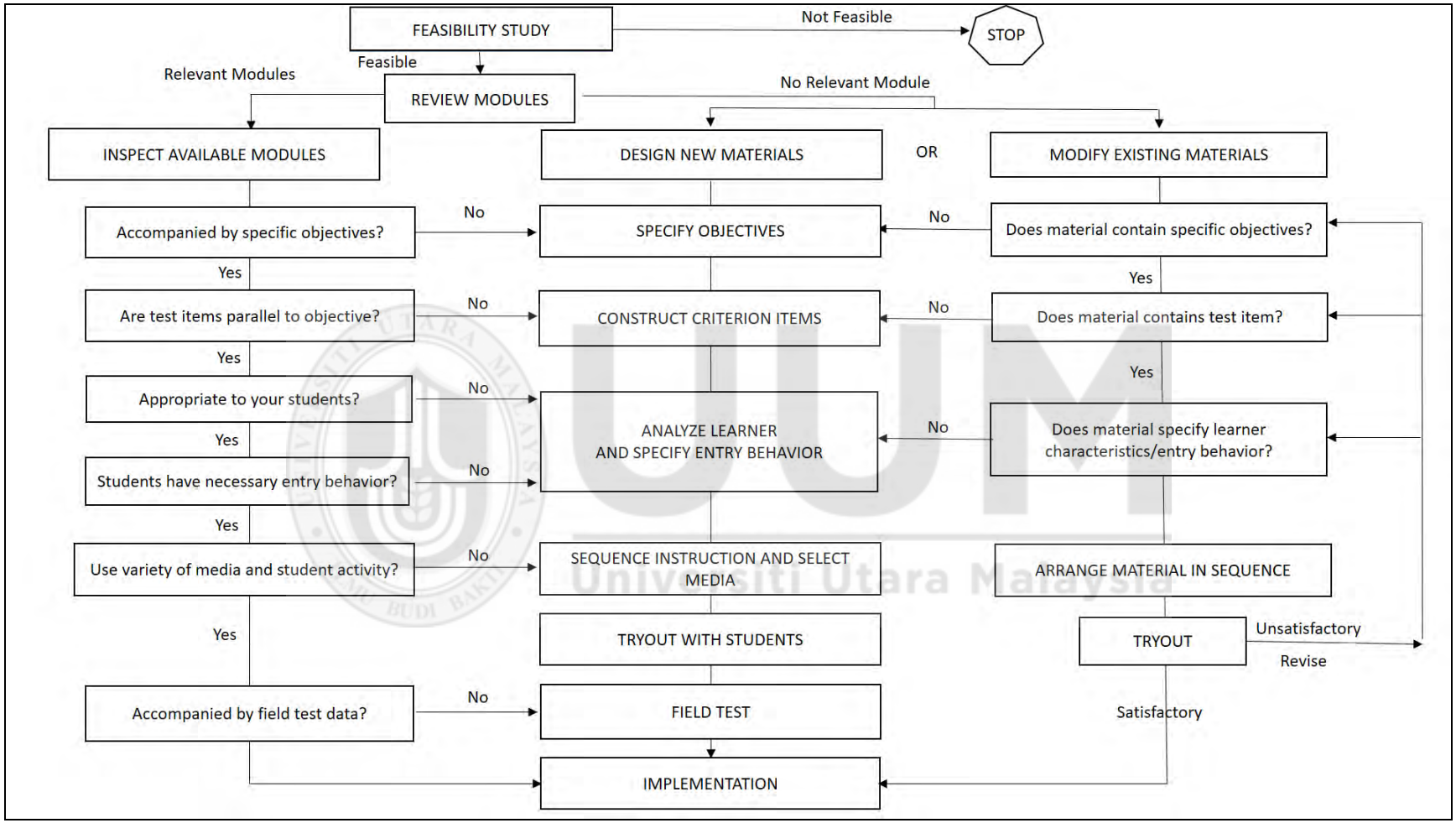

Figure 3.1. Modular instruction by Russell (1974)

This study utilizes the flow for designing new materials which composed of; 1) a feasibility study, 2) a review of existing modules, 3) specification of the objectives, 4) identification of the construct criterion items, 5) learner analysis and entry behavior specification, 6) establish the sequence instruction and media selection, 7) a tryout with students and 8) a field test. A need assessment was also performed prior to the construction of the module. The flow of the study is grouped into three phases (Table 3.1). The details for each phase is reported in the subsequent chapters.

Table 3.1

Flow of Study

	Phase	**Steps**
Phase-1	Pre-development	1) Need assessment 2) Feasibility study 3) Review of existing modules 4) Specification of the objectives 5) Identification of the construct criterion items 6) Learner analysis 7) Entry behavior specification
Phase-2	Development, validation and reliability	1) Establish the sequence instruction and media selection 2) Content validity 3) Tryout with students (face validity and reliability).
Phase-3	Evaluation	1) A field test (quasi-experimental study)

3.2 Research Design

This study aimed to comprehensively develop a tobacco use prevention program utilizing the modular guideline by Russell (1974). Due to the comprehensiveness of the steps in the guideline, no one specific research design could be used. Hence, the entire process was established in a mixed methodology study. This type of research design allows the use of blending multiple methods to answer research questions within a study (Edmonds & Kennedy, 2016). Although quantitative method is combined with qualitative in the design, the latter has been recommended to serve as a secondary role to the earlier method as presented in the current study (Edmonds & Kennedy, 2016). Among the five types of mixed methodology research design outlined by Tashakkori and Teddlie (2010) (in Edmonds & Kennedy, 2016) (Table 3.2), the current study utilized the sequential mixed type whereby the development of TUPY-S emerged from the earlier qualitative study.

The sequential design enhances the comprehensiveness of the research methodology through the utilization of focus group discussion in the qualitative component (Driscoll, Appiah-Yeboah, Salib, & Rupert, 2007). The open-ended questions used in this stage provides the opportunity for emergence of unexpected themes. Furthermore, Venkatesh, Brown, and Bala (2013) outlined three major strength for mixed method raised by Tashakkori & Teddlie (2003, 2009). Firstly, it is able to address confirmatory and exploratory research questions simultaneously. In the current study, the adolescents' perception was explored in a qualitative phase and the effectiveness was confirmed in the later phase. Secondly, mixed methods research allows stronger inferences than a single

Table 3. 2

Types of Mixed Methods Designs Outlined by Tashakkori And Teddlie (2010) (Edmonds & Kennedy, 2016)

Design	**Procedures**
Parallel mixed	○ Mixing occurs in a parallel manner. ○ Data are collected simultaneously (or with some time lapse). ○ QUAL and QUAN phases answer related aspects of the same research questions.
Sequential mixed (used in this study)	○ Mixing occurs across chronological phases (QUAL, QUAN) ○ Questions or procedures from one method emerge from, or depend on, the one prior. ○ Research questions are related to one another and may evolve.
Conversion mixed	○ Parallel design is used. ○ Mixing occurs when one type of data is transformed and analyzed both qualitatively and quantitatively. ○ This is used to answer related aspects of the same research questions.
Multilevel mixed	○ Parallel or sequential design is used. ○ Mixing occurs across multiple levels of analysis. ○ QUAN and QUAL data from these different levels are analyzed and integrated to answer aspects of the same (or related) research questions.
Fully mixed	○ Mixing occurs in an interactive manner at all stages of the study. ○ At each stage, one approach affects the formulation of the other. ○ Multiple types of implementation processes occur.

method due to the rigorous and lavishness of data. Finally, it provides an opportunity for a greater diversity with complementary views from different resources.

Creswell, Klassen, Plano Clark, and Smith (2011) claims mixed methods research is able to improve the quality and scientific power of data by allowing methodological diversity. Hence, it has been increasingly used in many health related research yielding favorable outcomes including cardiology (Curry, Nembhard, & Bradley, 2009), family medicine (Stange, Crabtree, & Miller, 2006), public health (Klassen, Smith, Black, & Caulfield, 2009). Furthermore, this method has been increasingly used in many other institutions including the National Institute of Mental Health, the National Institute of Nursing Research, and the National Cancer Institute (Creswell et al., 2011). Thus, the mixed methodology study design was chosen for this study and the details on designs involved are reported in the subsequent chapters respectively.

3.3 Research Area

This study was conducted in the District of Kota Bharu, Kelantan. Choosing the District of Kota Bharu maximised the assessibility of TUPY-S to the target population. The research area was purposively selected based on the high incidence of estimated tobacco use among adolescents in the District of Kota Bharu, Kelantan, the capability to become an adjuct strategy to support the Kelantan State initiative to transformed Kota Bharu into a smoke free city and the availability of information technology literate youth due to its higher socio-economic status compared to other districts.

Although the actual numbers of smoking adolescents in each district of Kelantan is unknown, the incidence can be assumed to be high since Kota Bharu district has the

highest population of adolescents where more than 35,000 are adolescents between the ages of 10 to 14 years old (Department of Statistics Malaysia, 2010). This proportion of adolescents represents almost three quarter of the total youths in the whole state. Thus, the population of this area could be considered to represent the entire population of adolescents in Kelantan.

Furthermore, Kota Bharu is currently on its journey to become a Smoke Free City under a State Project run by the State Government in collaboration with Malaysian Health Promotion Board (MySihat) by the name of IKBAR (*Initiatif Kota Bharu Bebas Asap Rokok*/ Kota Bharu Smoke Free Initiative). Multiple anti-tobacco activities are currently being designed and held at the state level as the core strategy to achieve the goal. Hence, developing a strategy to prevent tobacco use among the adolescents will certainly support the initiative. Moreover, the state of Kelantan falls fourth place in the ranking for the highest number of tobacco users in Malaysia in the latest National Health Morbidity Survey 2011 (Institute for Public Health, 2011). On top of that, the Tobacco and E-cigarette Survey among Malaysian Adolescents (TECMA) 2016 ranked Kelantan third highest in prevalence of current tobacco smokers among the adolescents in all states of Malaysia.

On top of that, since Kota Bharu is a capital city, making it an urban region whereby the local adolescents are exposed to the use of electronic gadget more often than their counterparts from other districts in Kelantan due to the city's higher socioeconomic status (Department of Statistics Malaysia, 2014). Thus, this environment would support the new strategy of using an interactive multimedia module in tobacco use prevention.

3.4 Study Population

The early adolescents attending the government primary schools are the most suitable population target population for TUPY-S. Firstly, according to Piaget's Theory, the cognitive process undergoes multiple stages, schemas, assimilation and accommodation, organization, and equilibration, spans over four stages throughout childhood (Piaget, 1976). As mentioned in Chapter-2, stage 3 (7 to 11 years old) is characterized by concrete cognitive stage whereby the ability to classify objects into different sets occur. In stage 4 (11 years onward) known as the formal operational stage, the reasoning ability becomes more abstract, idealistic, and logical. Thus, stage 4 seems to be the time when a person can comprehend abstract and symbolic messages. Hence, since health promotion tend to use symbolic gestures and pictures, this level of cognition is an essential requirement to avoid misinterpretation.

Secondly, neuro-biologically, the frontal lobe, the part of the brain that governs reasoning and decision-making, starts to develop during early adolescence. Thus, early adolescence is the best time to produce positive attitude against high-risk behavior.

Thirdly, in terms of the age of smoking initiation, epidemiological studies showed that, almost all smokers started to smoke during their youth. Local studies in Malaysia shows age of initiation between 11 to 14 years old (K. Lim et al., 2010; Lipperman-Kreda et al., 2014). Prevention programs for tobacco use aim to prevent initiation among those who had never used and prevent progression among those who have tried (Department of Health and Human Services USA, 1994; Johnston et al., 2012). Since most of smoking adolescents initiate smoking during secondary schools, preventive strategies should start

well before the vulnerable period. Hence, age between 10 and 12 years old have been said to be the ideal period age for preventive measures (Ausems et al., 2002).

Hence, the early adolescents attending public primary schools in Kota Bharu, Kelantan were selected as the target group of this study. Only government school was included in this study to allow coherency in educational exposure to the standard curriculum of the Ministry of Health. Descriptions of the population and sampling differ between each phase of the study and are outlined accordingly in the respective chapters.

3.5 Ethical Consideration

Early adolescents are considered a vulnerable group especially in becoming research subjects. This is due to the fact of them being a minor whereby they are dependent to their guardians in decision making. The problem is enhanced when the research is done in school setting which makes the adolescents becomes less independent in decision making as the school authorities are able to force them into participating. On top of that, the researcher could be too eloquent in getting their consent. The researcher attempted to minimize their loss of autonomy by executing the following steps;

1. The researcher allowed the school authorities to invite the participants. Hence, the researchers' bias could be reduced as researchers could be very persuasive to achieve the objectives of the study.
2. All the participants who fulfil the inclusion and exclusion criteria were invited. Thus, no specific groups were forced to participate in the study.
3. The participants were instructed to give their consent with the presence of their legal guardians and a witness, after their guardians agrees to allow them to

participate through an assent consent. The participants were allowed to not agree even if their guardians agreed for their participation.

4. The participants were allowed to leave the session at any time during the conduct of the research.
5. The participants were not given any monetary honorarium on participating to further ensure voluntary participation.

Another critical issue in dealing with minors is in getting informed consent from their legal guardian. However, there are times when the requirement for informed consent is waived (Blom-Hoffman et al., 2009), specifically when the research is done in school setting whereby the principals have the legal right through the Doctrine of in Loco Parentis (Hall & Manins, 2001). Blom-Hoffman et al. (2009) divided parental consent into active or passive. Active consent procedures require parents to sign a consent form indicating permission for their child to participate. Parents who do not return forms or who indicate on the form that they do not wish for their child to participate are considered "parental refusals". On the other hand, passive consent assumed parents' approval upon non-response to a research notice. This study applied the active parental consent. The Research Information Form (Borang Maklumat Kajian), Ascent and Consent Forms are attached in Appendix 1.

The study protocol was approved by the College of Art and Sciences, University Utara Malaysia. On top of that, permission from the Malaysian Ministry of Education and the Department of Education, State of Kelantan were acquired prior to the study.

3.6 Conclusion

A rigorous development of a modular instruction involves multiple comprehensive steps to ensure the ultimate objectives are reached. TUPY-S was developed following an extensive guideline on development of modular instruction by Russell (1974). Mixed methodology research design, in three phases, was utilized to accomplish the study objectives. The early adolescents living in Kota Bharu, Kelantan, were chosen as the target population for TUPY-S to equip them with adequate resilience against tobacco use in the future. The overall methodology used in this study is presented in Table 3.3 outlining the objective, study design, population, sample size, instrument and analysis used in each phase.

Table 3. 3

Summary on the main steps of methodology used in the study

Study	Objective	Design	Population	Sample size	Instrument	Analysis
Phase 1 Pre-development	To explore the adolescents' perception on an effective tobacco use prevention strategy	Qualitative	16 years old	40	Semi-structured questionnaire (Appendix 2)	Thematic analysis
	To develop, validate and determine the reliability of Tobacco Use Prevention for the Young Questionnaire (TUPY-Q)	Discriptive	10 to 12 years old	538	TUPY-Q (Appendix 3)	Factor Analysis Cronbach Alpha reliability test
Phase 2 Development	To develop, validate and determine the reliability of Tobacco Use Prevention for the Young Module (TUPY-S)	Discriptive	10 to 12 years old	121	Evaluation form (Appendix 6)	Cronbach Alpha reliability test
Phase 3 Evaluation	To determine the effectiveness of TUPY-S	Quasi-experimental	10 to 11 years	217	TUPY-Q (Appendix 3)	RM-ANCOVA

CHAPTER FOUR

PHASE 1: PRE-DEVELOPMENT

As mentioned in the previous chapter, the Pre-Development phase followed the multiple essential steps as outlined by Russel (1974) before development of a module. This phase composed of feasibility study, review of existing modules, specification of the objectives, identification of the construct criterion items, and learner analysis and entry behavior specification. This chapter reports each step in terms of the study population, instruments, design and protocol, data analysis and results.

4.1 Step 1: The Need Assessment

The study began with a need assessment in a qualitative study (Zin, Hillaluddin, & Mustaffa, 2016). The objective of this phase is to explore the adolescents' perspective on an effective TPU prevention program. A need assessment is a part of the feasibility study. It is a method of determining if a training need exists and, if it does, what training is required to fill the gap. The gap between the present status and desired status, would indicate an area for a training need (Gupta, 2011).

4.1.1 Study Participants

Study participants were recruited from public daily secondary schools in urban and rural area of Kota Bharu District, State of Kelantan, Malaysia, among 15 to 16 years old students. Forty participants were selected using a purposive sampling method representing tobacco users, ex-tobacco users and non-tobacco users (Centres for Disease Control and Prevention, 2012). The tobacco users are those who are currently using tobacco products. Ex-tobacco users are tobacco users who have stopped using tobacco for

the past six months. Non-tobacco users are those who denied ever trying cigarette or tobacco product. Participants were those selected by the school counsellor or teacher and agreed to be enrolled.

The target group for Phase-1 was the late adolescents attending a public secondary school with high prevalence of smokers in Kota Bharu. The late adolescents are chosen for this phase due to multiple reasons; firstly, during the late adolescence, the brain continues to develop and reorganize itself, leading to enhancement in the analytical and reflective capacity (Santrock, 2012); secondly, according to Piaget's Theory, from the age of 11 years onwards, the formal operational stage, the reasoning ability becomes more abstract, idealistic, and logical (Piaget, 1976); and finally, during late adolescence age, more confidence is gained and adolescents possess clarity in their own opinions and identity (Santrock, 2012). Thus, the late adolescence age is the most suitable group to explore subjective matters whereby the ability to provide opinions and cognitive expression are essential. However, only form four students were selected to avoid interference with the SPM preparation among form five students.

4.1.2 Study Instrument

Semi-structured interviews were utilised with the interview guide that was constructed in Malay and delivered in local dialect to allow participants to express their ideas comfortably. The semi-structured interview guide was adapted from a previous study among the educators by Tahlil et al. (2013b). The questionnaire was chosen due the similar objective despite the difference in study population. Questions explored the following: 1) the need to develop a new strategy, 2) the barriers with the currently available strategies, 3) the content of an effective strategy, and 4) the delivery of an

effective strategy. In addition, socio-demographic data was obtained prior to the interview. The semi-structured interview guide is attached in Appendix 2.

4.1.3 Study Design and Protocol

The adolescents' perception was explored through a qualitative study involving eight focus group discussions (FGDs). This research method was chosen as it is particularly useful in exploring attitudes, views, beliefs, feelings and behaviour while allowing the feasibility of exchanging ideas and discussion (Chua, 2012).

FGD was done by the researcher, attended by a transcriber and was audio recorded. The transcriber was selected based on language proficiency. There were four to eight participants per group in a session. The smokers, ex-smokers or non-smokers sessions were done separately. Each session lasted for about one hour. The number of sessions was stopped when data saturation was reached as observed by similar information obtained after two consecutive sessions. The data was triangulated by the types of participants. The smokers were selected to allow exploration on the elements which made them use tobacco products. The ex-smokers and non-smokers would offer the insights on the measures to prevent adolescents from using tobacco products. Moreover, the non-smokers would be able to provide specifically on their ability to avoid tobacco use.

4.1.4 Data analysis

Thematic analysis was done using a Computer Assisted Qualitative Data Analysis Software (CAQDAS) which is also known as the NVivo 11 software (Bazeley & Jackson, 2013; Braun & Clarke, 2006). CAQDAS is particularly useful in managing, shaping and making sense of unstructured information. This powerful software classifies,

sorts and arranges qualitative data, resulting in a systematic thematic analysis of interview materials by identifying structured themes, and consequently developing meaningful, evidence-based conclusions. The data was then transcribed and imported into the NVivo 11 software. Subsequently, the researcher reviewed the interview transcripts thoroughly, identified the meanings of each response and classified them into nodes and child-nodes, which eventually were condensed and developed into themes and subthemes.

4.1.5 Results

Characteristics of Participants

A total of 40 participants were recruited in the study and involved in the FGDs. Twenty-one of them were from an urban located school and 19 from a rural located school. Sixteen were current tobacco users (FDG current users), another 16 were non-tobacco users (FDG non-users) and 8 were ex-tobacco users (FDG ex-users). All the participants were male aged between 15 and 16 years old.

The Thematic Analysis

The thematic analysis of the interview transcripts was constructed among four main themes as outlined by the semi-structured questionnaire used in this study: 1) need to develop new strategy, 2) barriers with the current strategies, 3) content of an effective strategy, and 4) delivery of an effective strategy. The sub-themes that emerged are described in the respective sections.

1) Need to develop new strategy

All groups including the current-users, ex-users and non-users agreed to the need for a revised preventive program. In response to the question whether it is necessary to tell their younger siblings not to use tobacco and incorporate them into the school curriculum, they answered *"ya (yes)… sangat penting (very important)"* (FGD ex-users: urban). When asked on their willingness to guide the new students from using tobacco, the tobacco users said *"ya kami bantu (yes, we would)"* (FDG current-users: rural).

2) Barriers with the current strategies

Among the barriers discussed during the FGD include having teachers who smoke tobacco. *"Kalau cikgu merokok, senang ke nak ajar murid untuk tidak merokok? (If the teachers are smoking cigarettes, would it be easy to teach the students not to smoke?)"*, a group replied *"susah (difficult)"* (FGD current-users: urban).

Some of them felt that the prevention program attended was not clear leading to short-lasting effectiveness. Upon asking the reason why they continue to use tobacco products despite attending the preventive program in primary school, they replied *"kurang jelas, Masa itu tak lama. Naik tingkatan dah tak rasa. (the program was unclear, and the effectiveness is temporary. We do not feel the effectiveness anymore once we attend secondary school)"* (FGD ex-users: rural).

Despite not using tobacco products, the non-users described the effectiveness of currently available preventive programs as temporary: *"Berkesan…Berkesan meta (sekejap...the effect was only temporary)"* (FGD non-users: urban). Addiction among those who have tried, the environmental influences with tobacco use being widely accepted and peers

influence have been claimed to be the major factors contributing to the short-lasting effect of available preventive programs. Other barriers include the self-perception for being healthy; *"Sebab tak kena kat diri sendiri lagi (because they had never experienced the illnesses and feels healthy)"* (FGD ex-users: urban).

3) Content of an effective strategy

The content of an effective prevention program was discussed in depth among all participants. Nine subthemes were recognized upon analysis.

a. Negative health outcomes

Information on negative health outcomes have been raised as one of the key issues in all FGDs as an effective strategy. The current users recommended to include the knowledge on the negative effects of tobacco use in the prevention program. *"Bagi tahu tentang keburukan merokok… tunjuk (Inform about the negative effects of smoking. Show them the effects)"* (FGD users: rural). Other health related outcomes from smoking outlined by this group include *"pening, busuk, ketagih, menyebabkan kanser... pastu hisap dadah (headache, malodorous, addiction, causes to cancer and eventually could lead to drug abuse)"*. The tobacco users acknowledged addiction as an important consequence of tobacco use. They described addiction as *"Terbiasa…Tak sedap duduk…Rasa gelisah…Rasa something wrong bila tak hisap (used to smoking…uncomfortable uncomfortable feeling when not smoking)"*.

Questions imposed in this matter yielded many responses including: *"merokok bahaya … ketagih (tobacco use is dangerous…addictive"* (FGD users: rural), *"sakit jantung, asthma, sesak nafas an mati muda …ketagihan* (*heart attack, asthma, difficulty breathing*

and die early… addictive)" (FGD non-users: urban). A non-user from the rural area claimed witnessing his grandfather who was a heavy smoker die from heart attack disheartened him from using tobacco: *"datuk saya kuat merokok… mati sebab serangan jantung (my grandfather was a heavy smoker… died from heart attack"* (FDG non-users: rural). However, the non-users in the rural area was not strongly agreed to the need to include the addictive nature of the smoking, as they answered *"mungkin (maybe)"* (FDG non-user: rural) when provoked on this issue. Nevertheless, most of the other groups felt the necessity.

The ex-users stressed on the knowledge of negative health outcome as an essential component in prevention strategy. In response to the question on what we need to tell the non-users in terms of knowledge, they answered: *"…merokok tak berfaedah… buat batuk dan bibir jadi hitam… kanser mulut dan paru-paru (…using tobacco products is of no avail …causes cough and the lips will turn black …mouth and lung cancer)"* (FGD ex-users: rural). When asked on the difference between the smokers and non-users living in the urban area, they answered *"bibir hitam, kurus, susah bernafas dan sesak nafas (black lips, thin, difficulty breathing and breathlessness)"* (Ex-smoker: urban).

The non-smokers suggested information on nicotine to be included. *"mengandungi nikotin, sejenis bahan kimia yang sebabkan kanser (Contains nicotine, chemicals that can lead to cancer)"* (FGD non-user: urban). The ex-user agreed to include information on the effect of nicotine. In response to the question on the need to inform about nicotine, they replied *"ya… perlu (yes…should be included)"* (FGD ex-users: rural).

On top that, the effects of cigarette smokes on those exposed were raised. The non-users presumed more significant effects on their health compared to the smokers. *"Dia lagi bahaya…Bahaya…Asap bahaya…Dia bahaya kepada orang yang bau asap daripada orang yang menghisap (More dangerous to those who were exposed … dangerous smoke …more dangerous than the smokers)"* (non-user: urban). The other group of non-users expressed the tobacco smoke as *"kotor ... bahaya untuk orang mengandung ... bau bususk (dirty and dangerous for pregnant mothers ...malodorous)"*. They also proclaimed the necessity to include the knowledge on effects of tobacco smoke in the program. The health effects of tobacco use were acknowledged in the conversation as they felt *"menyusahkan orang lain sebab doktor kena rawat mereka (tobacco use will cause burden to others because the doctors have to treat them)"* (FGD non-users: rural).

The non-smokers suggested information on the benefits of not smoking to be included: *"Beritahu kebaikan tidak merokok … tak dapat penyakit … umur Panjang (Tell them the benefits of not smoking …free from diseases …live longer)"* (non-user: rural).

b. Peer influence

The role of peer influence was raised significantly: *"pilih kawan yang betul (choose friends properly)"* (FGD current-users: rural). *"Pilih kawan yang betul… Pilih yang pandai… kawan yang merokok hasut orang lain untuk merokok sekali… mereka ni yang bersalah (Choose your friends properly… Choose those who are clever in academic... smoking friends persuade others to use tobacco product… that is the main culprit)"* (FGD non-users: urban). *"Bagi nasihat macamana nak pilih kawan… macamana nak elak kawan yang tak elok… pilih yang tak merokok dan pandai … elakkan perokok (Give*

them advice on how to choose good friends… and how to avoid bad friends… choose the non-users and clever friends… and avoid the tobacco users)" (FGD ex-users: rural).

c. Religious education

Response on enquiries on the need to include religious education in the preventive strategy produced a mixture of response. Those in urban school seemed to not agree with the suggestion; *"tak ... takkan berkesan (No ... it will not be effective"* (FGD ex-users: urban), *"sikit ... tak berkesan langsung (very slight effect… no effect at all)"* (FGD non-users: urban). On the other hand, some of those from rural felt strengthening religious values will be important in prevention whereby advice to strengthen religious faith has been suggested as a component in the strategy: *"Jangan tinggal solat (Don't miss your daily prayer)"* (FGD users: rural). The importance of strong religious value was claimed to be associated with improvement in self-efficacy and eventually refusal skill. In response to question on how you could increase one's inner strength, they answered: *"... solat hari-hari, baca quran dan puasa (...perform your daily prayer, recite Quran and fast)"* (FGD ex-users: rural).

d. Negative economic impact

Information on negative economic impact has also been agreed on as an essential component. Tobacco users from the rural area would advise the younger adolescents against tobacco use as it will lead to wastage of their pocket money: *"... habis duit kalua merokok (... you will run out of money if you use tobacco product)"* (FGD current-users: rural), *"jangan merokok...erm...membazir duit (do not smoke cigarette ... erm .... wasting money)"* (FGD non-users: rural and urban), *"... merokok membazir duit (...using tobacco is a waste of money)"* (FGD ex-users: rural).

e. Family value and parenting

The adolescents feel that significant others especially parents play a significant role in prevention from using tobacco. Enforcing discipline and punishment by the parents were claimed to be effective among the users and non-users. In response to the question on what they would do if they see their own younger siblings tried to use tobacco product?", they replied *"Beritahu abah ... tampar dia ... ketatkan disiplin (Inform father… slap him ... tighten discipline)"* (FGD current-users: rural). Significant others seemed to be able to produce effective advice against tobacco use among the non-users from rural area: *"mak kata jangan merokok ... nenek kata jangan merokok ... nanti jadi macam tok. Tok banyak merokok ...meninggal sebab kena sakit heart attack. Mak kata merokok menjatuhkan maruah keluarga (mother said do not smoke cigarette ...grandmother said do not smoke cigarette or else you would end up like grandfather… my grandfather was a heavy smoker and died from heart attack…mother said, using tobacco products would be degrading the family dignity)"* (FGD non-users: rural).

f. Legislation

Knowledge on tobacco use related legislations was claimed to be ineffective as a component of an effective prevention strategy. In response to the question on how they feel about the effectiveness of current legislation, they answered: *"tak berkesan (not effective)"* (FGD non-users: urban). However, they do feel that the information on current legislation should be included in the intervention: *"patut beritahu mereka undang-undang pasal rokok (we should tell them about the legislations related to tobacco use)"* (FGD non-users: rural). On top of that, information on the school punishments would be

effective to warn the students: *"boleh dirotan di khalayak ramai (…could get public caning)"* (FGD ex-users: rural).

g. Self-efficacy

Importance of strengthening perceived self-efficacy which determines feelings, thoughts, self-motivation and behavior has been discussed in all focus group discussions. In response to question on how the non-tobacco users should react when offered, they answered: *"kena kuat semangat … pastu kata tokse (they have to be emotionally strong … and refuse)"* (FGD ex-users: rural). In responding to subsequent questions on how to strengthen emotional control, they answered: *"mereka kena kuat …elakkan berkawan dengan perokok …jangan rapat dengan mereka …belajar rajin-rajin …jadi pandai (…have to be strong …avoid being friends with the users …do not become close to them …strive hard in your academic …be smart)"* (FGD ex-users: rural). The current users claimed that having a strong resilience is essential to avoid tobacco use: *"kena kuat …buat tak tau kat mereka (…have a strong willpower …ignore them)"* (FGD users: rural)

h. Refusal skill

Enhancing refusal skill is considered as a vital component in tobacco use prevention. The ex-users expressed the need to teach the young adolescence on the skills to avoid influence: "*bagi nasihat macamana nak elakkan pengaruh contohnya…bagi motivasi …amaran jangan merokok …beritahu merokok membazir duit …elakkan berkawan dengan perokok (give them advice on how to avoid being influenced such as …give them motivation …warn them not to smoke …tell them smoking is a waste of money …avoid being friends with smokers)"* (FGD ex-users: rural).

The participants conveyed similar refusal techniques upon being questioned on how to refuse offer to use tobacco products. The non-users suggested to *"kata taknak ...buat tak tahu ...elakkan dekat dengan mereka (say 'NO'... ignore the request and avoid being around them)"* (FGD non-users: urban). The non-users from the rural area suggested direct rejection as a successful refusal strategy: *"lawan balik, tunjuk berani ...buat taktahu ...jalan dalm kumpulan ...bagitahu cikgu atau mak ayah ... kata taknak ... atau ambik je pastu buang (fight back, show your bravery ...ignore them ...walk in groups ...tell the teachers or family ...say 'NO' ... or just take the cigarette and throw it away later)"* (FGD non-user: rural). They also suggested to give reasons and get away from the situation*: "for example, when being offered to smoke, tell them you have other things to do and leave ...avoid being at the same place in the future ...avoid the toilets (smoking ports)"* (FGD non-user: rural).

The current users suggested a few ways to refuse offers on tobacco products use: *"kata taknak ...cakap ayah saya tak bagi ...buat tak tahu (say no, ... say my father prohibit me from smoking, ...ignore)"* (FGD users: rural). The ex-users also discussed similar ways to decline offers to use tobacco products: *"...buat tak tahu ...kata taknak ...bagi tahu cikgu (...ignore them, ...say 'NO' ...report to teachers")*, and avoidance was also suggested: *"lari dari tempat tu ...tukar sekolah (...run away from the situation ...change school"* (FGD ex-users: urban).

i. Miscellaneous

Other useful information to the question on the content of an effective strategy include: *"merokok tak berguna ...orang benci ...cikgu benci (using tobacco is useless, people will hate ...teachers will hate you"* (FGD current-users: rural); *"merokok boleh sebabkan*

masalah pelajaran …buang masa …pencemaran alam sekitar (using tobacco will decrease your school academic performance… wasting time… pollute the environment)" (FGD non-users: urban); and *"galakkan aktiviti macam sukan …futsal, bola sepak, jogging, … main roller blade (encourage alternative activities especially sports including futsal, football, jogging … play roller blades"* (FGD non-users: urban).

4) Delivery of an effective strategy

An effective delivery of the preventive strategy against tobacco use is essential in ensuring successful transfer of knowledge and skills. In response to the question on how should the knowledge on negative health outcomes from using tobacco product be delivered, they answered: *"tunjuk video …video live operation …bukan bahan bacaan …games berkesan macam adventure, action ..strategy (show them video… live video on operation… not reading materials… games would be effective such as adventure, actions or strategy)"* (FGD current-users: rural), *"tunjuk bukti live …live surgery …kesan live (show live evidence… live surgery… live effects)"* (FGD ex-users: urban), *"game tembak-tembak …kuiz …teka silangkata …lakonan …kartun …benda bergerak (shooting games… quiz…cross-word puzzles…acting sketch…cartoons, moving objects)"* (FGD ex-users: rural), *"buat video …tunjuk eksperimen …hiburan …games …video cara menolak …lakonan (…produce video… show experiment …entertainment …games …puzzles … video on refusal skills… acting sketch with real people)"* (FGD non-users: urban),*"video live lakonan manusia …interview orang yang kena kesan merokok …lakonan …suara dengan subtitle …game …kuiz …silangkata …bagi points atau hadiah (videos with real people…interview with people who had acquired tobacco use related illnesses…acting*

sketch…voices with subtitles…games, quiz, cross-word puzzles…give rewards)" (FGD non-users: rural).

4.1.6 Conclusion

Step 1 aimed to assess the need develop a new tobacco use prevention module. The specific objective was to explore the adolescents' perspective on an effective tobacco use prevention strategy in terms of content and mode of delivery. The adolescents' in this study agreed to the need to develop a new strategy to suit the current era. The recommended contents include health outcomes, peers' influence, religious education, economic, family value, law and legislation, strengthening self-efficacy and refusal skill. The adolescents' recommended the use of multimedia in delivering the contents.

4.2 Step 2: The feasibility study

The feasibility study involves a process whereby the non-academic or logistic factors are being considered prior to a module development (Russell, 1974). According to Russell (1974), the three major considerations that should be examined include the achievable scheduling of the activities, arrangements of the equipments and supplies, and affordable cost. Feasibility study is considered an essential first stage of the service or product development cycle in business and marketing, with the aim to analyse the viability of a proposed project (Overton, 2007). The analyses include the performance objectives expected by the organisation, and plan for evaluation, a cost benefit report and a project charter.

Project TUPY underwent feasibility study at all the selected schools with the school authorities (Zin, Hillaluddin, & Mustaffa, 2017). This phase of the study enabled a

mutual agreement to be achieved between the researchers and the school authorities, leading to a smooth conduct through the entire study. Unforeseen mishaps were minimized and almost always related to the weather. Hence, feasibility study ensures transparency of a project, predictable financial requirement, leading to an increase likelihood of succeeding a project.

Site visits to the potential schools and discussions with the school authorities were done to discuss the study protocol. Subsequently, agreement between both parties was achieved on the dates and venue to conduct the study. Each school appointed a correspondent teacher to assist the researcher throughout the study. In terms of cost, most of the software intended to be used are available free of charge upon on line registration. Only one software requires minimal monthly fee. The information obtained from the schools were discussed among the researchers and concluded that the study is feasible.

4.3 Step 3: The literature review of the existing modules

The researcher intended to develop a tobacco use prevention module which suits the current youths of Malaysia. According to Russell (1974), the relevant modules should be inspected using a checklist assessing the objectives, test items, entry behavior, media, content, and field test data. The literature on tobacco use preventive modules developed in Asian countries was systematically reviewed for the objectives, test items, entry behavior, media, content, and field test data as recommended by Russell (1974). A systematic review allows the appraisal and construction of a summary of evidence-based article reviews in a single document (V. Smith, Devane, Begley, & Clarke, 2011). Systematic review enables the vast data to be critically analyse and systematically compared in the desired direction. Thus, despite the limited data on tobacco use prevetion

strategy in this region, a systematic review was performed to ensure a comprehensive review is achieved.

4.3.1 Study design and protocol

Systematic review of all studies on tobacco use prevention was conducted since the year 2000 (Section 2.5). The literature search was performed on the Google Scholar, PubMed, EbscoHost, Cochrane Library, Scopus and Science Direct databases for studies that described the effectiveness of tobacco use prevention strategies among the adolescents.

4.3.2 Data analysis

Thematic analysis was done on the previous relevant studies according to the research designs, interventions, outcomes measured and results.

4.3.3 Results

The literature on tobacco use preventive modules developed since the year 2000 were systematically reviewed for the objectives, test items, entry behavior, media, content, and field test data. In terms of objective, almost all the studies reviewed intended to prevent youth from using tobacco. All studies have similar test items analyzed as the main outcomes. Although the entry behavior varies between studies, some of them have similar target population as ours. None of the studies used information technology as the delivery medium. Concerning the content, most of the studies emphasized on the health effects of smoking and skill to reduce smoking temptation. The filed test data of the studies showed positive short-term effect which does not seemed to sustain in long term run. The details of the systematic review are presented in Section 2.5 and Tables 2.1 to 2.3.

4.3.4 Conclusion

Thus, to our knowledge, rigorously developed tobacco use preventive strategies are still lacking this region let alone being delivered using information technology. On top of that, the adolescents' perspective has not been widely considered in the development. Hence, the researcher concluded that there is no relevant module suitable to our need and decided to develop a new module.

4.4 Step 4: Specification of the objectives

Specification of the objectives is an essential initial stage in a modular development (Russell, 1974). Clearly stated objectives assist the developer, consumer and the target group in directing the teaching and learning process. This step guides the developer in designing a module, assists teachers in selection and evaluation of a module and enable the students to have a clear goal. According to Russel (1974), the objectives provide direction and focus to the developer to ensure that each medium and activity is aimed to meet a specific objective. Hence, the module will devoid unnecessary elements and have optimum value of resources. Moreover, a module with clear objectives would allow the consumer to evaluate the appropriateness and feasibility of conducting the module for the target population. Furthermore, it increases awareness on the expectation of the module and provides a clear learning goal. The general objective of TUPY-S and each of the activity were outlined with the aim to fill in the gap to improve the tobacco use prevention strategy among the early adolescents. The objectives of this study are as outlined in Chapter 1 (section 1.7). The specific objectives of the activities in TUPY-S are listed in Appendix 8.

4.5 Step 5: Identification of the construct criterion items*:* Development, validation and reliability assessment of TUPY-Q

The construct criterion items involve the development of a criterion test or an instrument which would guide the module development and evaluate its effectiveness (Russell, 1974). This stage aims to develop, validate and determine the reliability of a questionnaire to evaluate TUPY-S, namely, the Tobacco Use Prevention Strategy for the Young Questionnaire (TUPY-Q).

4.5.1 Study design, protocol and statistical analysis

The development of TUPY-Q follows the process of instruments construction and evaluation of Health Measurement Scale as summarized in Figure 4.1 (Streiner, Norman, & Cairney, 2014). Researchers in clinical and health sciences are frequently in need to develop measurement scales. Health Measurement Scales enables researchers to develop scales to measure health related outcomes for health education interventions. A structured approach in the development would much assist the development of a reliable scales particularly in subjective health related states such as attitude, quality of life and resilience. Since tobacco use prevention strategies are closely related to health education, the Health Measurement Scale guide by Streiner et al. (2014) was used to ensure TUPY-Q becomes an accurate, sensitive and easy-to-use measurement scale. The essential steps in the guideline include generating items, scaling response, selecting items in validation and reliability.

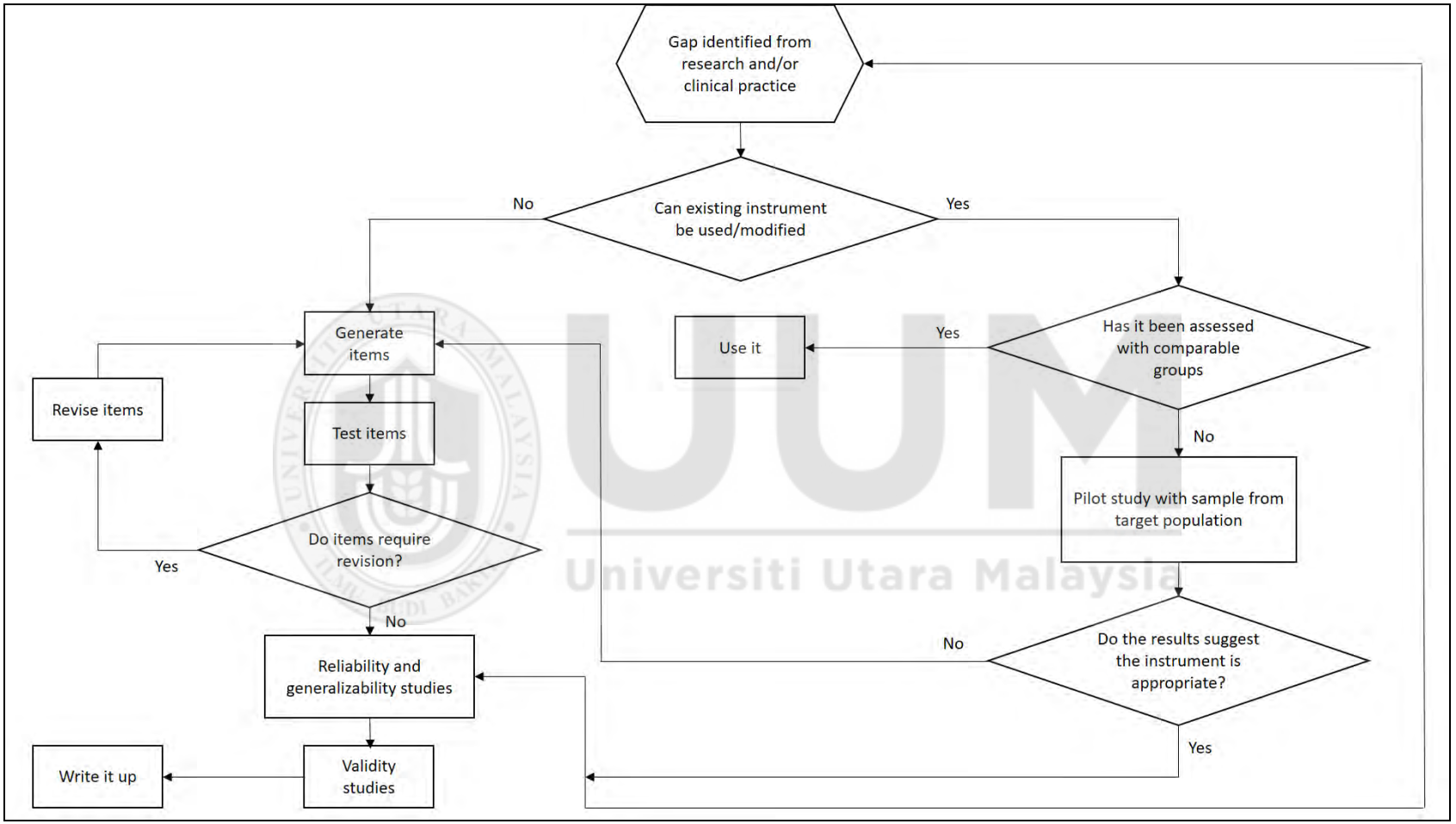

Figure 4. 1. Health Measurement Scale flowchart (Streiner et al., 2014)

a. Generate items & scaling response: Development of TUPY-Q

Streiner et al. (2014) outlined multiple ways to generate items in a questionnaire. Among the recognized source of items are focus group, key informant interviews, clinical observation, theory, research and expert opinion. The domains for TUPY-Q were developed following the items frequently used to evaluate a tobacco use prevention programs in prior studies and adapted from questionnaires used in previous similar studies (Lee at al., 2007). The domains in TUPY-Q include: 1) Knowledge, 2) Attitude, 3) Intention to use, and 4) Refusal Self-efficacy. Since there is no readily available instrument that could be used to evaluate TUPY-S, let alone to suit the Malaysian adolescents, the left pathway of the flowchart was followed in this study. Items for refusal were adapted, with permission, from a questionnaire on self-efficacy and refusal skills used in a similar study in Taiwan (Lee et al., 2007).

Scaling response is the next step in questionnaire development. Streiner et al. (2014) divided the types of responses into categorical and continuous. The choice of method is determined by the nature of the questions. The categorical responses require only categorical judgement by the respondent e.g. 'yes/no'. On the other hand, the continuous responses expect the respondent to devise among interval-level measurement with subjective scales. Among the continuous response, three categories were outlined;

1. Direct estimation techniques – respondents are required to choose their response by a mark on a line or check in a box
2. Comparative methods – respondents are required to choose among a series of alternatives

3. Econometric methods – respondents describe responses by anchoring to extreme states e.g. 'perfect health-death'

The categorical with 'yes/no/do not know', for the knowledge, and direct estimation technique with 'check in box' for attitude, intention to use, refusal-skill and self-efficacy, were used in TUPY-Q as they would ensure a valid and reliable responses among the early adolescents (Streiner et al., 2014).

There are multiple types of scales included in the direct estimation methods, namely, the Visual Analogue Scales (VAS), Adjectival Scales, Likert Scales and Face Scales (Streiner et al., 2014). The VAS is a 'line with fixed line' whereby the respondents are required to place a mark on the line corresponding to their perceived state. The Adjectival Scales added descriptors along a continuum e.g. respondents are required to mark on a dividing line. The Likert Scales are similar to the Adjectival, except that they are bipolar whereby the respondents are able to choose negative responses. It also allowed a 'neutral' response to be chosen. The Face Scales attempted to overcome the literacy requirement of the above scales. It allows assessments among young children and those with cognitive disorder.

Streiner et al. (2014) recommended five to seven responses for each item as adequate and would provide valid and reliable items in a questionnaire. They also advocate a clearly labelled scale to yield reliable response. The neutral option can be added to allow flexibility to the respondents, positioned centrally in a bipolar item. Moreover, numbers placed with responses are claimed to improve understanding of the adjective used. Reversed items would help to reduce deployment careless responses.

Each type has its own advantages and drawbacks. Considering the target population of TUPY-Q, early adolescents in a standard government schools, the 5-point Likert scale was the chosen method in this study.

b. Selecting the items: Validation of TUPY-Q

Two types of validation were done comprising of content and face validities, and construct validity. The protocols are as follow;

Content and face validities

These steps are the technical judgements on a scale's coherency with the desired domains and its suitability to the target population (Streiner et al., 2014). The validation was carried out by three experts in the field, two renowned primary school teachers in Malay Language and two early adolescents. The details of the experts are provided in Appendix 4. Each participant was given a complete set of TUPY-Q and allowed to review the questionnaire independently. Subsequently, a feedback session was arranged to allow open discussion between the reviewer and the researcher. Some wordings and sentence structure had been changed pertaining to the recommendations made.

Construct validity

This is a process to evaluate whether the items of a scale are measuring a 'hypothetical construct' which composed of the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) (Streiner et al., 2014).

c. Reliability assessment of TUPY-Q

Chua (2013) defines reliability of a research measurement as the capability in obtaining identical values when the same scenario is repeatedly measured using the same scale. The

process of validation and reliability was reversed from Streiner et al. (2014) as validation would change the structure and number of items. Thus, reliability done after validity would enable evaluation of internal consistency of the final model. This study utilized the Cronbach's alpha internal consistency method.

4.5.2 Study population for construct validity and reliability assessment of TUPY-Q

A total of 538 early adolescents, aged between 10 and 12 years old, from two secondary schools were purposively chosen to evaluate the construct validity of TUPY-Q. The schools were chosen due to the massive number of students and located roughly in the middle between the intervention and control schools selected for the later evaluation study. Thus, the contamination of data was minimized.

To ensure reliability of the outcome, sample size between 5 to 15 of the number of generated items is adequate to determine the construct validity and reliability of a questionnaire (DeVon et al., 2007). Since there were 71 items in the preliminary model, a sample size between 355 and 1065 is adequate for this phase of the study. Hence, a group of 538 participants is adequate to assess the reliability of TUPY-Q. The sociodemographic data of the participants were obtained at the beginning of the questionnaire.

4.5.3 Statistical analysis for construct validity and reliability

The construct validity using exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was done using SPSS version 20.0 and AMOS version 18 respectively.

A principal axis factoring was conducted on the preliminary model in exploratory factor analysis (EFA). Data was entered into SPSS version 20.0. Number of factors to be

extracted was based on the scree plot. A factor is considered significant if it contains at least three observed variables. Orthogonal rotation was used because the factors were expected to be correlated with each other. Variables with factor loading less than 0.3 were excluded from further analysis (Finch, French, & Immekus, 2016; Suhr, 2006).

Next, items with satisfactory EFA were exported into AMOS version 18 for confirmatory factor analysis (CFA). Convergent validity is achieved when all items in a model are statistically significant with average variance extracted (AVE) of ≥0.5. AVE is the average percentage of variation explained by the items in a construct. Several goodness-of-fit indicators were analyzed to determine the construct validity, namely, goodness of fit index (GFI), comparative fit index (CFI), Tucker-Lewis index (TLI), and $\chi 2$/df, with the desirable values of >0.05, >0.95, >0.95 and <5.0 respectively (Finch et al., 2016; Suhr, 2006). The fitness was also tested with the root mean square error of approximation (RMSEA) test with acceptable fitness value of <0.08 (Finch et al., 2016).

Finally, the final model of TUPY-Q generated by CFA was estimated for reliability by the internal consistency and Cronbach's alpha coefficient with the satisfactory value of ≥0.70 (Finch et al., 2016).

4.5.4 Results

a. Generate items & scaling response: Development of TUPY-Q

The items of TUPY-Q were adapted from the commonly used items in previous similar school-based tobacco use prevention study by Lee et al. (2007) namely knowledge, attitude, intention to use, and refusal self-efficacy.

i. Generate Items

Knowledge and attitude

The questions assessing knowledge and attitude were developed following the content and objectives of submodules in the Tobacco Use Prevention Strategy for the Young (TUPY-S) (Appendix 8). TUPY-S was developed from the recommendations by the adolescents as reported in Section 4.1.5 supported by the Health Belief Model, Theory of Planned Behavior and Social Learning Theory. The details on the development of TUPY-S are presented in Chapter 5. Submodule 3, Tobacco products and Friends, was excluded for knowledge due to the skills nature of the activities rather than them being knowledge based. Submodule 7, Self-efficacy, were omitted for both knowledge and attitude as it was tested independently in another section of TUPY-Q. The preliminary models for knowledge and attitude were composed of 26 and 20 items respectively.

Intention to use and Refusal

The items for Intention to use, Refusal Skills and Self-efficacy were adapted from a set of questionnaires developed by Lee et al. (2007) in their study on smoking prevention among adolescents in Taiwan. Permission was obtained from the correspondence author through email. The questionnaire was originally developed in Mandarin and translated by a linguist and content expert, and a linguist expert into Malay language. However, after a thorough review by the researchers, the translated questionnaires were unsuitable for our population since it was developed specifically for the adolescents living in Taiwan. Thus, the content of the questionnaires was adapted to produce a culturally acceptable set of questionnaires for Malaysian adolescents. The preliminary models for Intention to use, Refusal Skills and Self-efficacy were composed of 5, 8 and 12 items respectively.

ii. Scaling responses

Knowledge

Items on knowledge were developed from the content and objective of TUPY-S. The items required the respondent to choose among three categorical responses, namely, 'true', 'false' and 'do not know'. Although, respondents could choose among the said categories, only 'true' was given a score in the analysis. Thus, 'false' and 'do not know' carried 0 score as they do not indicate that the respondents have correct knowledge.

Attitude, Intention to Use, Refusal-skill and Self-efficacy

The direct estimation technique for the continuous responses were utilized for these variables due to the quantitive estimation of the magnitude of the required responses (Streiner et al., 2014). The adjectives used for the responses were tailored by the meaning of the items. Hence, responses chosen for Attitude and Self-efficacy were "strongly disagree", "disagree", "not sure", "agree" and "strongly agree", as the items required the respondents to state their agreement on the said items. Consistently, the chosen items for Intention to Use and Self-efficacy were "strongly will not", "will not", "not sure", "will" and "strongly will", as the items required the respondents to state their willingness to perform the said items. All the responses were labelled and numbered, with a 'neutral' position placed in the middle due to the bipolar nature of the items.

b. Selecting the items: Validation of TUPY-Q

The process of items selection composed of a series of steps whereby items are screened and tested on its validity. The validation process involved content validity, face validity and construct validity, after which a preliminary model of TUPY-Q was developed.

i. Construct validity

The construct validity using the exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) were done among 538 adolescents aged between 10 and 12 years old. SPSS Version 20.0 and AMOS Version 18 were utilized respectively. The sociodemographic data of the respondents are presented in Table 4.1.

Table 4. 1

Characteristics of Participants for Construct Validity and Reliability Tests Of TUPY-Q

Items	**mean (SD)**	**n (%)**
Age (years)	10.8 (0.84)	
Pocket money (RM)	5.2 (1.79)	
Race		
Malay		536 (99.6)
Others		2 (0.6)
Religion		
Islam		537(99.8)
Others		1(0.2)
Sex		
Male		262(48.7)
Female		275(51.1)
Having smoking household members		
Yes		210 (39.8)
No		297 (55.2)

Exploratory factor analysis (EFA)

Principal axis factoring extraction with promax rotation was applied on the 71 items (preliminary model) which were entered into SPSS version 20.0 for analysis. Kaiser-Meyer-Olkin was 0.849, Bartlett's test of sphericity was significant (P-value<0.001). Scree plot and results are as shown in Figure 4.2 and Table 4.2 respectively.

Ten items (K01-K04, K6, K7, K10, K12, K15, K19) of knowledge and six items (A1-A5, A16) of attitude were removed due to low communalities and factor loadings. Four factors were extracted, namely, knowledge, attitude, intention to use and refusal self-efficacy. Refusal skills and self-efficacy were regarded as one factor and renamed as Refusal Self-efficacy. Factor correlations ranged from r = 0.322 to 0.813.

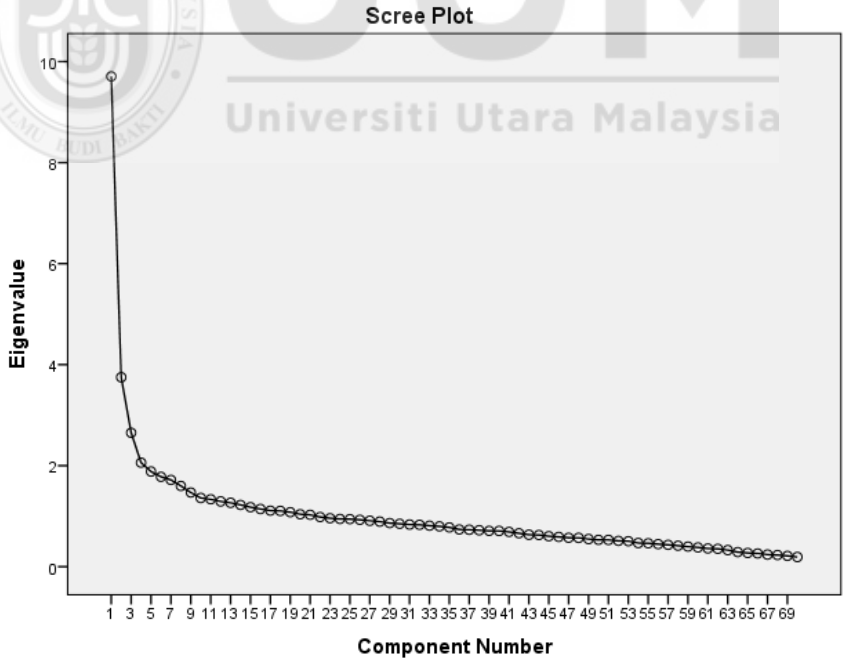

Figure 4. 2. Scree plot of Exploratory Factor Analysis

Table 4. 2

Extracted Factors, Factor Loadings and Reliability Of TUPY-Q

Factor	**Items post-EFA**	***Factor loadings**	**Items post-CFA**	****Reliability /AVE/CR**
Knowledge	K05	.486	K05	
	K08	.322		
	K09	.326		
	K11	.382		
	K13	.373	K13	
	K14	.386		Reliability = 0.7
	K16	.468	K16	
	K17	.441	K17	AVE = 0.3
	K18	.352	K18	
	K20	.491	K20	CR = 0.7
	K21	.455	K21	
	K22	.403	K22	
	K23	.411	K23	
	K24	.564	K24	
	K25	.496	K25	
	K26	.496	K26	
Number of items	16		12	
Attitude	A06	.465	A06	
	A07	.458	A07	
	A08	.448	A08	
	A09	.408	A09	
	A10	.465	A10	Reliability = 0.7
	A11	.457	A11	
	A12	.375		AVE = 0.3
	A13	.542		
	A14	.396	A14	CR = 0.7
	A15	.460	A15	
	A17	.551	A17	
	A18	.441	A18	
	A19	.435	A19	
	A20	.305	A20	
Number of items	14		12	
Intention to use	U01	.765	U01	Reliability = 0.8
	U02	.699	U02	
	U03	.769	U03	AVE = 0.4
	U04	.813	U04	
	U05	.747	U05	CR = 0.8
Number of items	5		5	

Table 4.2 continued

Refusal skills	R01	.567	R01	
	R02	.605	R02	
	R03	.511	R03	
	R04	.563	R04	
	R05	.528	R05	
	R06	.541	R06	
	R07	.643	R07	
	R08	.622	R08	Reliability = 0.9
Number of items	8		8	
				AVE = 0.8
Self-efficacy	S01	.667	S01	
	S02	.604	S02	CR = 0.9
	S03	.356	S03	
	S04	.652	S04	
	S05	.701	S05	
	S06	.651	S06	
	S07	.686	S07	
	S08	.686	S08	
	S09	.492	S09	
	S10	.526	S10	
	S11	.436	S11	
	S12	.354	S12	
Number of items	12		12	
Number of items for refusal			20	
Total number of items				49
Overall reliability				0.85

* Extraction Method: Principal Component Analysis.
Rotation Method: Promax with Kaiser Normalization.
** Reliability: Cronbach alpha (>0.7)
AVE: Average variance extracted (>0.5)
CR: Composite reliability (>0.6)

Confirmatory factor analysis (CFA)

The preliminary model of 55 items extracted from EFA was exported to AMOS version 18 for confirmatory factor analysis (CFA). Multiple fitness models were generated until acceptable fitness achieved. Fitness assessments include Chi-squared/degree of freedom (χ2/df), Tucker-Lewis index (TLI), comparative fit index (CFI), and root mean square error of approximation (RMSEA). Standardized factor loadings (standardized regression weights) for each item were identified after constructing the full measurement model to meet criteria fitness indexes. Model 1 showed unacceptable fitness level χ2/df of 1.92, TLI of 0.748, CFI of 0.765 and RMSEA of 0.041. Six items (K8, K9, K11, K14, A12 and A13) with factor loading of <0.6 (ranging −0.04 to 0.53) were removed one by one, leaving 49 items in the final model. The final model composed of four domains, namely, knowledge, attitude, intention to use, and refusal (refusal-skills and self-efficacy), with 49 items demonstrating acceptable factor loadings, domain to domain correlation, and best fit (χ2/df = 2.304; TLI = 0.783; CFI = 0.802; and RMSEA = 0.049). Results are presented in Table 4.2 and Appendix 11.

c. Reliability assessment of TUPY-Q

The overall reliability of TUPY-Q together with each domain, for the target population, were satisfactory with Cronbach alpha values of 0.9. (Table 4.2).

4.5.5 Conclusion

TUPY-Q underwent extensive steps in development including validation and reliability assessment. The final model of TUPY-Q was satisfactory in terms of validation and reliability hence suitable to be used among the early adolescents attending primary schools in Malaysia.

4.6 Step 6: Learner analysis and entry behaviour specification

Russell (1974) professed that the characteristics of the target population must be determined precisely before designing modular activities. There are two groups of characteristics which are: 1) the general learner characteristic, and 2) the specific entry behavior. However, since this is a mixed methodology study, the population varies among the stages of development of TUPY-S and are described in the relevant sections.

4.7 Conclusion

Phase 1 of this study represents the pre-development stage of Tobacco Use Prevention Strategy for the Young (TUPY-S). The need assessment managed to show the gaps in the currently available tobacco use prevention strategies and outline recommendations for improvement. TUPY-S was agreed to be feasible between the researcher and the school administration. Currently existing modules are not comprehensive enough to comply with the adolescents' recommendations on effective tobacco use prevention strategies. TUPY-Q is a satisfactorily validated assessment tool with high inter-rater reliability to evaluate TUPY-S among the early adolescent living in Malaysia.

CHAPTER FIVE

PHASE-2: THE DEVELOPMENT, VALIDATION AND RELIABILITY OF TUPY-S

The main objective of this study was to develop the Tobacco Use Prevention Strategy for the Young (TUPY-S) targeted for the early adolescents living in Malaysia. Phase-2 composed of three stages whereby the sequence instruction and media selection were established, subsequent validity was done by the experts in the field and the target group, and finally reliability was evaluated. This chapter reports each sequence in terms of the study population, instruments, design and protocol, data analysis and results.

5.1 Stage 1: The sequence instruction and media selection

The step of sequence instruction involves the sequential development of the content of a module, and the media selection to select the desired delivery mode of a given module (Russell, 1974). This section reports on the steps taken to develop the content of TUPY-S and its mode of delivery.

The contents of TUPY-S were determined from integrating adolescent's perspective obtained through the focus group discussion into the Health Belief Model and supported by the The Social Learning Theory and Theory of Planned Behavior. The mode of delivery followed the recommendations made by the adolescents in the prior phase of this study. Details on the qualitative study exploring the adolescents'' perspective have been reported in Section 4.1.

The sub-themes generated in the qualitative study exploring the adolescents' perspective on an effective tobacco use prevention were grouped into seven sub-modules as outlined in Table 5.1 and described in Appendix 8. The activities in each submodule was developed according to the objective/s of the sub-module respectively. Some of its contents were adapted from currently available preventive activities conducted by the Malaysian Ministry of Education through the "Kelab Doktor Muda", and "Modul Kesihatan Reproduktif Remaja" by the Federation of Family Planning Associations, Malaysia.

The adolescents in PHASE-1 study suggested the use of information technology as the medium of choice for the current era as outlined in section 4.1.5 (Zin et al., 2016). They proposed the use of live pictures, live videos with interview with tobacco use related diseases affected individuals, interactive games or quiz with rewards, and cartoons. Hence, the development of TUPY-S was anchored by using the Microsoft® PowerPoint version 2010. The researcher chose this software due to its compatibility with most of the available computers at schools in Malaysia and is used widely in these premesis. The individual activities were developed using multiple softwares including Sparkol®, PowToon® and Biteable.com®. These softwares are available online upon subscription. Some of the videos and photographs were contributed with permission by the National Poison Centre of Malaysia and Ministry of Health of Malaysia through their health education website (available online: http://infosihat.com.my).

Table 5.1

Content of TUPY-S

Submodule	Activities	Objectives
1 Tobacco products	1.Getting to know tobacco products 2.Tobacco products and human body 3.Reinforcement exercise	1.To learn the types and content of tobacco products 2.To learn about nicotine addiction
2 Tobacco products and Health	1.Tobacco is bad 2.Tobacco smoke is bad 3.Me without tobacco 4.Reinforcement exercise	1.To learn about the effects of tobacco use on health 2.To learn about the effects of tobacco use on primary, secondary and tertiary smokers 3.To learn the benefits of not using tobacco
3 Tobacco products and Friends	1.Say "NO" to smoking 2.Reinforcement exercise	1.To learn the refusal techniques to avoid influence
4 Tobacco products and Religions	1.Tobacco use in Islam 2.Tobacco use in Budhism 3.Tobacco use in Hinduism 4.Tobacco use in Christianity	1.To learn the common Malaysian religion's perspective regarding tobacco use
5 Tobacco products and Law	1.Malaysian law on underage smoking 1.Malaysian school regulation	1.To learn about the law and regulation available in Malaysia regarding tobacco use among the minors.
6 Self-Efficacy	1.I am smart 2.I am firm	1.To increase the self-efficacy against tobacco use

Table 5.1 continued

7 Healthy life style	1.I am precious 2.Stress management 3.Let's exercise	1.To increase self-appreciation 2.To learn on causes of stress and how to manage them 3.To learn the benefit of exercise
8 My Family and I	1.I am an adolescent 2.My parents 3.My family	1.To learn about the characteristics of an adolescent 2.To increase parental appreciation 3.To understand one's role and responsibility for own family
Finale	1.Reinforcement exercise	1. To learn the life experiences of ex-tobacco users with chronic lung disease and laryngeal cancer

5.2 Stage 2: Validation of TUPY-S

Validity is the degree at which a particular instrument measures what it is supposed to measure (Carmines & Zeller, 1979). The same approach is used in the development of modular instruction whereby a validity is defined as the degree at which a module delivers what it is supposed to deliver. In this study, two types of validity were done, namely content validity and face validity.

5.2.1 Content validity

The content validity was done among six experts in the field and modular instruction development. The experts were required to review the content and feasibility of TUPY-S. The experts' panel is composed of a child psychologist, a sociologist, a counselor expert, an expert in tobacco use among adolescents, a spirituality expert and an expert in information technology (Appendix 4). A child psychologist was invited to review the module as an expert in mental, social and emotional development of children. Social

development focuses on understanding, preventing, diagnose and treat developmental, cognitive, social and emotional issues. The sociologist was included to share their expertise in the study of behavior and social interaction. A counselor with experience in dealing with adolescents was considered to be an important person in the panel of reviewers. An expert in tobacco use among adolescents was invited due to her undeniable knowledge and experience in the field. A spiritual expert was included in the panel to assist in the specific section on religion in TUPY-S. An expert in information technology (IT) was invited to review the feasibility of using IT in delivering the content of TUPY-S.

The process was done according to a questionnaire outlined by Russell (1974) which comprised of five statements with five points Likert scale (Appendix 5). General recommendations were also obtained subjectively. Each assessor was supplied with a copy of the written content of the module and an assessment form. Assessment was done individually, and feedbacks were either discussed openly or emailed to the researcher. Feedbacks were analyzed quantitatively and qualitatively, and subsequent consensus was made with other co-researchers.

a. Statistical analysis

According to Russell (1974), a modular instruction has a good content validity when the module has the following conditions: 1) It covers the targeted population; which means the module has been developed in accordance with the background aspects and the behavior of the subjects in the research, 2) The module has been implemented during a normal and satisfactory situation, 3) Time allocated to the individuals to complete the module was sufficient and appropriate, 4) The performance of the individual was enhanced after the completion of the module, and 5) There was an attitude change

towards betterment after the completion of the module. Scores are 1 (strongly disagree), 2 (disagree), 3 (undecided), 4 (agree) and 5 (strongly agree). Percentage of the scores were calculated using the formula as follows:

$$\text{Percentage of content validity} = \frac{\sum \text{Total score by expert (x)}}{\sum \text{Total score (y)}} \times 100$$

(Noah & Ahmad, 2005)

TUPY-S has a good overall content validity at 86%. The minimum score at 70% was obtained for statement on "The time allocated is adequate". The maximum score was obtained for statement "This module is suitable for the target population" at 94%. Thus, since the scores obtained for all statements were above 70%, TUPY-S has a good content validity (Noah & Ahmad, 2005). Hence, the content of TUPY-S achieved the the objective of its development. However, subjective feedbacks from the experts were taken into consideration in improving the module. Generally, the main concern of all the experts are the feasibility of time allocated in the overall conduct of the module.

b. Results

Table 5.2

Percentage of Content Validity by Experts

No.	Item	Expert reviewer						Average score per item	Percentage of total score per item (%)
		R1	R2	R3	R4	R5	R6		
1.	This module is suitable for the target population.	4	5	5	5	5	4	4.7	94
2.	This module is feasible to be delivered to target population.	4	4	4	5	5	4	4.3	86
3.	The time allocated is adequate.	2	3	4	3	4	5	3.5	70
4.	This module is able to prevent tobacco product use among adolescents.	3	4	5	5	5	5	4.5	90
5.	This module is able to change the attitude of the adolescents towards tobacco product use.	3	4	5	5	5	5	4.5	90
Average score per expert		16	20	23	23	24	23		
Percentage of total score per expert (%)		64	80	92	92	96	92		
Overall percentage of content validity (%)									86

5.2.2 Face validity

Face validity is the stage whereby a module is tested among a small group of participants with the desired characteristics of the target group.

a. Study population and sampling

Ten early adolescents, a mixture of boys and girls, between the age of 10 and 11 years old participated in this phase of the study. They were from the third class of seven classes which was ranked according to academic performance. The school was selected due to its far location from both areas which are involved in the Phase-3 of the study as to reduce contamination of information to the study groups. The class was purposively chosen by the school due to their availability during data collection as to avoid classes who were having formal teaching and learning sessions.

b. Study design and protocol

Participants were exposed to the entire module in two groups of five. Considering the cognitive development of the early adolescents, a structured feedback questionnaire with five points Likert scale was utilized to ease the participants in evaluating TUPY-S (Appendix 6). Focus group discussions were done subsequently to allow subjective discussion between the researcher and the participants. Subsequently, the researcher identified the weaknesses of the module in terms of the suitability of activities, time duration to complete the module, suitability to the activities with the target population, feasibility to reach the objectives, and capability of the target population to follow the instructions.

The participants were instructed to answer a feedback questionnaire after completing each submodule (Appendix 6). The questionnaire is composed of 30 items evaluating their understanding on each activity of each submodule and their experience in undertaking the module. Examples of the questions for activity 1 in submodule 1 (Tobacco Product): "I am able to understand the types of tobacco products" and "I am able to execute the activities easily". The participant is considered to have agreed to each statement when score is more than 2.5 (50%). Subsequently, focus group discussions were done among the girls and boys separately for subjective feedbacks.

c. Results

Subjectively, all participants expressed satisfaction with the module and no new recommendations were proposed by both groups. Objectively, all participants agreed that they were able to understand objectives of each activity evidenced by the percentage score between 74 and 92 %. Percentage of score per reviewer is also satisfactory with score between 55 and 98 %. The overall percentage of face validity is high (85.5%) which implies a satisfactory tryout phase of TUPY-S development. Summary of the objective evaluation is illustrated in Table 5.3.

Table 5.3

Objective Evaluation for Face Validity

Activity	**R1**	**R2**	**R3**	**R4**	**R5**	**R6**	**R7**	**R8**	**R9**	**R10**	**Average Score per activity**	**Percentage of score per activity (%)**
Submodule-1	4	4	5	4	4	3	1	4	3	3	3.7	74
Submodule-2	5	4	5	4	5	3	4	3	5	5	4.2	84
Submodule-3	5	4	4	5	5	4	2	3	4	4	4.4	88
Submodule-4	3	5	5	5	5	3	2	3	3	3	4.0	80
Submodule-5	5	5	5	5	5	4	4	3	4	3	4.6	92
Submodule-6	5	4	5	5	5	5	3	4	4	3	4.3	86
Submodule-7	5	3	4	5	5	5	2	4	5	4	4.4	88
Submodule-8	4	5	4	5	5	5	4	4	3	3	4.5	90
Average score per reviewer	4.5	4.3	4.7	4.7	4.9	4.5	2.6	3.5	3.9	3.5		
Percentage of score per reviewer	90	86	94	94	98	90	55	70	78	70		
Overall percentage of face validity												85.5

Score: 1 – strongly disagree 2 – disagree 3 – undecided 4 – agree 5 – strongly agree

5.3 Stage 3: Reliability assessment of TUPY-S

Reliability assessment is known as "students' tryout" among a study sample similar to the target group (Russell, 1974). According to Russell (1974), a success of a module is determined largely by the effort to try it out with real, live participants. The main objective of this stage is to improve the material to meet the objectives of the module.

A good module should be consistent in producing the same effect on repeated use by different individuals. Reliability is referred to the tendency toward consistency in repeated use of a measurement or in this context a module. However, a reliability test specifically invented to evaluate the reliability of a module has been an ongoing challenge. Noah and Ahmad (2005), outlined a very practical way to assess reliability of a module which has been modified from a method suggested by Vale (1998). Although originally the module reliability method was done in the field of engineering, Noah and Ahmad (2005) has proven its use in development of modules in social sciences owing to the similarity in the structure of the modules. Both modules composed of multiple submodules, activities belong to the submodules and steps in completing the modules. This study utilized the same step in assessing the reliability of TUPY-S.

5.3.1 Population and sampling

A total of 121 early adolescents, aged between 10 and 12 years old, were purposively chosen to assess the reliability of TUPY-S. The participants were chosen by the teachers due to their availability during data collection as to ensure non-interference with the formal teaching and learning sessions. The school was chosen due to the massive number of students and located roughly in the middle between the intervention and control

schools selected for the later evaluation study. Hence, the contamination of information was minimized.

In order to ensure satisfactory reliability of the outcome, a sample size between 5 to 15 times of the number of generated activities is adequate to determine the reliability of a module (DeVon et al., 2007). Since there were 23 number of activities in the module, sample size between 115 and 345 is adequate for this phase of the study. The sociodemographic data was obtained at the beginning of data collection.

5.3.2 Study design and protocol

Reliability assessment involved a group of participants with the same characteristics of the target group. Participants were exposed to the entire module. Russell (1974) advocated observation of the participants' ability to follow steps in a module as an essential part to evaluate a module.

This study deployed a questionnaire as outlined by Noah and Ahmad (2005) which was developed based on the steps within the module (Appendix 6). The questionnaire is a five-point Likert scale questionnaire assessing participants' understanding of each activity within the module and ability to complete the module. The reliability analysis was done using SPSS version 20.0 to determine the internal consistency through alpha Cronbach.

5.3.3 Results

The characteristics of the 121 early adolescents participated in the study are summarized in Table 5.4. Table 5.5 shows the reliability analysis result for TUPY-S. The overall reliability coefficient is high at 0.91 despite the relatively low values (<0.6) for submodules 3, 5 and 6. Submodule 3 composed of two video presentations on refusal techniques and the effects of using tobacco on friendship. Submodule 5 composed of two video presentations on the Malaysian Law and School Regulations regarding tobacco use among under-aged. Submodule 6 composed of two self-directed interactive quizzes on decisions when being provoked to use tobacco products. The smaller number of activities in these submodules could have contributed to the lower reliability. Moreover, the cognitive development of the early adolescents which varies between individuals could have further depreciate the consistency among the participants. As a countermeasure, an assistant was provided to the participants upon request throughout the session. On top of that, animated presentations were used to improve the understanding and interest. However, since the overall Cronbach Alpha value is very high, possibly indicating a synergistic effect among the submodules, all the submodules were retained in the module. The overall result is consistent with a claim by Russell (1974) whereby the ability of participants to reach the objective of a module is determined by every step of module's activity.

Table 5.4

Characteristics of Participants for Reliability Test

Items	**mean (SD)**	**n (%)**
Age (years)	10.4 (0.67)	
Pocket money (RM)	6.9 (12.6)	
Race		
Malay		121 (100)
Sex		
Male		
Female		
Having house members smoking		
Yes		31 (28)
No		80 (72)
Ever tried smoking		
Yes		6 (5)
No		115 (95)

Table 5.5

Reliability Test Results for TUPY-S

Submodule TUPY-M	**Number of activities**	**Cronbach alpha**
Submodul 1: Tobacco products	3	0.68
Submodul 2: Tobacco products and Health	4	0.62
Submodul 3: Tobacco products and Friends	2	0.51
Submodul 4: Tobacco products and Religions	4	0.75
Submodul 5: Tobacco products and Law	2	0.54
Submodul 6: Self Efficacy	2	0.59
Submodul 7: Healthy life style	3	0.69
Submodul 8: My Family and I	3	0.60
Reliability Coefficient of the Module	23	0.91

5.4 Conclusion

TUPY-S aims to prevent tobacco use among early adolescents. The sequence instruction was determined by adolescents' perspective on an effective tobacco use prevention module and supported by the Health Belief Model, Social Learning Theory and Theory of Planned Behavior. TUPY-S is delivered using information technology as suggested by the adolescents. The content was satisfactorily validated by a panel of experts and a group of early adolescents. It was proven to have high inter-rater reliability indicating its readiness to undergo an intervention study to determine its effectiveness. The screenshots of TUPY-S are provided in Appendix 9.

CHAPTER SIX

PHASE-3: THE EFFECTIVENESS OF TUPY-S

The final stage in a modular instruction development is the evaluation of its effectiveness among a sample of the target group. This stage allows evaluation of a given module in its actual condition and subsequently enable adjustments to be made to further refine the module prior to its enactment in to the public education system. This chapter reports the evaluation of TUPY-S in terms of the study design, population, instruments, protocol, statistical analysis and results.

6.1 Study design

The effectiveness of TUPY-S was evaluated in a school based two-armed quasi-experimental study among early adolescents at risk to use TP at three intervals: pre-intervention, at 1-week and 8-week post-intervention. Two-armed quasi-experimental study was chosen due to its ability to show that an independent variable is the only factor which causes systematic change in the dependent variable (Christensen & Waraczynski, 2001; Chua, 2012). This is the most suitable design to compare outcome between two groups among specific population.

6.2 Population and Sampling

The reference population for TUPY-S was the early adolescents in Malaysia at risk to use tobacco products. The source population was male primary school adolescents attending public primary schools in Kota Bharu, Kelantan, in 2017. Only male adolescents were included in this study due to the much higher risk of tobacco use among them owing to the significantly higher prevalence compared to females (Mohammed et al., 2016; WHO,

2013; WHO, 2017). Neuro-biologically, the frontal lobe, the part of the brain that governs reasoning and decision-making, starts to develop during early adolescence (Santrock, 2012). Because this development starts later and takes longer in boys, their tendency to act impulsively and to be uncritical in their thinking lasts longer than in girls. They may also feel confused about their own personality making peer-group opinions become very significant in their decision making. Thus, more boys than girls tend to involve themselves in high-risk behavior including using tobacco products.

Purposive sampling was applied in selecting six participating schools as recommended by the State Department of Education of Kelantan. The six selected primary schools were the feeder schools of two secondary schools with high prevalence of tobacco use. The geographical location of the schools was also taken into consideration to reduce the possibility of data contamination among the control group. On top of that, different group of schools were designated to receive intervention than the control groups to further reduce the possibility (Figure 6.1). The control and intervention groups were matched equally in terms of demographics whereby both groups are composed of a well-established school (*Cluster School*), a school in military base and a school in rural area.

All male standard five adolescents in each selected school were invited to participate in the study. Male adolescents have been found to be at a significant higher risk of using tobacco products compared to female as shown in the official statistics and our preliminary survey. The Global Youth Tobacco Survey 2010 (GYTS 2010) reported a global percentage of 16% of male adolescents uses tobacco compared to only 6% among female adolescents. In the researcher's preliminary survey among 121 early adolescents between the age of 10 and 11 years old, all 6% of those who have ever smoked tobacco

products were males. Only those in standard five were included to allow a homogeneous study sample as they belong to the early adolescents' group aged between 10 and 11 years old. The standard six adolescents were excluded since they were prohibited to participate in this study as instructed by the Ministry of Education. Those in standard four were also excluded as they consist of a mixture of nine and 10 years old whereby those aged nine years old are not considered as early adolescents. Furthermore, only male adolescents in standard five were included in this study to allow coherency in social exposure and level of cognitive development.

The inclusion and exclusion criteria are as follow;

Inclusion criteria

1. Primary school adolescents in standard five
2. Male

Exclusion criteria

1. Illiterate
2. In "Kelas Khas" or "Sekolah Khas" (i.e. special education class)

6.3 Sample size calculation

Adequate sample size will minimize the Type 1 and 2 errors. Sample size calculation was done using the standard deviation for pre-intervention attitude score from previous study (Tahlil et.al, 2013). Sample size calculation was done to compare the difference in pre-intervention attitude score between intervention and control group. Sample size calculation was done using Power and Sample Size Calculation (PSSC) software for comparing two means (Dupont & Plummer, 1997). The parameters are as follows:

α = 0.05

Power = 0.8

σ = Standard deviation of "intention to use pre-intervention"

= 10.1 (Tahlil et.al, 2013)

δ = difference in attitude score between groups = 4

m = ratio between control group and intervention group = 1

SS = 101

Considering 20% of dropout rate,

SS = 101 + 20/100 x 101 = 120 per group

The sample size is 120 subjects in control group and 120 subjects in intervention group. The sample size calculation for other variables are tabulated in Appendix 7. The total recruitment for this study is 240.

However, only 225 pupils responded to the invitation, thus recruited into the study, with 113 in the control group and 112 in the intervention group. Furthermore, eight of them were excluded at the end of the study due to incomplete data with missing follow up. Hence, 217 of them completed the study with 109 receiving the intervention. However, this number is acceptable since 20% dropout rate was allowed in the earlier sample size calculation. The division of the study participants are illustrated in Figure 6.1.

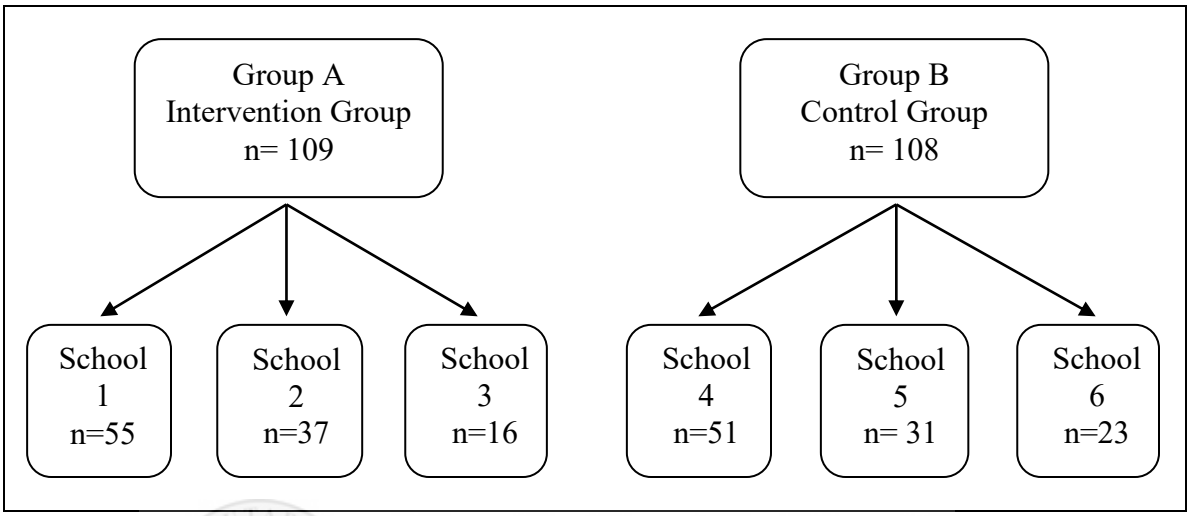

Figure 6.1. Study participants divided into groups for evaluation of TUPY-S

6.4 Study instruments

PHASE-3 utilized two instruments which were developed and validated in the prior phases of this study. Firstly, the TUPY-Q which was developed and tested for validity and reliability in PHASE-1 of the study. Secondly, the TUPY-S which was developed and tested for validity and reliability in PHASE-2 of the study.

6.4.1 TUPY-Q: a Malay-version Questionnaire on Tobacco Use Prevention

TUPY-Q is valid and reliable to assess knowledge, attitude, intention to use, and self-efficacy and refusal skill on tobacco use prevention among the early adolescents in Malaysia. It was developed from the Health Belief Model modified by adolescents' perception. Content validity was done among the experts and face validity was among the target group. Subsequent construct validity and internal consistency were done among 538 adolescents aged between 10 and 12 years old. Exploratory factor analysis, internal

consistency reliability and descriptive analysis were performed using SPSS Version 20.0. Confirmatory factor analysis was done with AMOS Version 18. The EFA produced a preliminary model with 55 items. Following CFA, the final model is composed of four domains, namely, knowledge, attitude, intention to use, and refusal (refusal skills & self-efficacy), with 49 items demonstrating acceptable factor loadings, domain to domain correlation, and best fit (Chi-squared/degree of freedom = 2.304; Tucker-Lewis index = 0.783; comparative fit index = 0.802; and root mean square error of approximation = 0.049). The internal consistency for each domain were 0.7, 0.7, 0.8 and 0.9 respectively, with overall value of 0.85. The details on its development are outlined in Section 4.5.

6.4.2 TUPY-S: The Tobacco Use Prevention Strategy for the Youth

TUPY-S was developed following an extensive guideline on development of modular instruction by Russell (1974). Development of TUPY-S is an integration between the adolescents' perspective on an effective tobacco use preventive strategy and the social theories. Feasibility was agreed among the researcher and the school authorities. Since culturally suitable rigorously developed tobacco use preventive strategies delivered using information technology (IT) are lacking in the literature, the objective of TUPY-S is to prevent tobacco use among the elderly adolescents living in Malaysia. Identified construct criterion items include knowledge, attitude, intention to use, self-efficacy, and refusal skill. The target population is the early adolescents belonging to the generation-Z. The content was developed from the adolescents' perspective and delivered using IT in Malay language. The content validity, done among six experts in the field and module development, was good at 86%. The students' tryout showed satisfactory face validity

subjectively and objectively (85.5%) and high Cronbach Alpha reliability (0.91). The details on its development are outlined in Chapter-5.

6.5 Study protocol

The study protocol was presented and discussed with the school's personnel. All standard five pupils in the six selected schools were given briefing regarding the study by the school personnel. Letters of invitation to participate in the study, study information sheet, consent form and assent form were distributed among the pupils to be given to parents. Only those who returned completed consent and assent forms and fulfil the inclusion and exclusion criteria could proceed with the study.

The control schools received only the standard teaching on the tobacco use via the national school curriculum. The intervention schools received the interactive multimedia tobacco use prevention strategy (TUPY-S) on top of the standard school curriculum. The frequency and length of exposure were determined during the pilot studies (face validity and reliability assessment). The participants were required to answer the evaluation questionnaire (TUPY-Q) at three intervals: pre-intervention, at 1-week post-intervention and 8-week post-intervention. The flow of this phase of the study is illustrated in Figure 6.2.

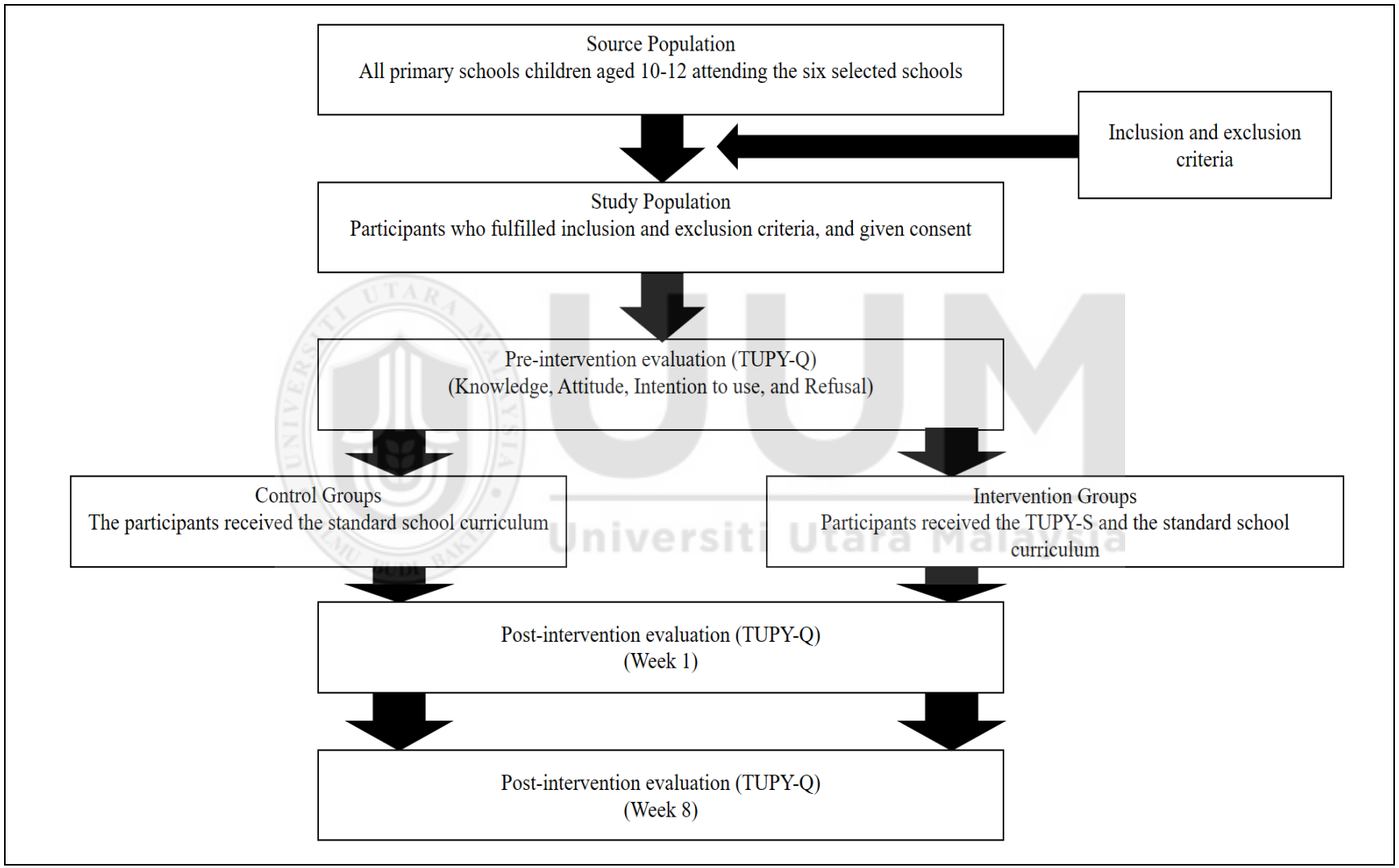

Figure 6.2. The quasi-experimental study evaluating the effectiveness of TUPY-S

6.6 Statistical analysis

Descriptive statistics was used to analyze the socio-demographic data of the participants. The results are displayed in mean difference with standard deviation unless otherwise stated. The differences between group at baseline characteristics were analyzed using the chi-squared test for dichotomous variables and independent t-test for continuous variables. The Repeated Measure ANCOVA was applied to determine the effect of independent variables (the study groups) on the dependent variables (knowledge, attitude, intention to use and refusal self-efficacy). Pocket money was considered as a covariate.

6.7 Results

6.7.1 Baseline profiles of participants

A total of 225 participants were recruited into the study with 113 in the control group and 112 in the intervention group from six purposively selected primary schools. However, eight of them were excluded at the end of the study due to incomplete data following missing follow up. Thus, 217 of them completed the study with 109 received the intervention with total drop-out rate of 10%. The baseline score of dependent variables and demographic data are shown in Table 6.1 and Table 6.2 respectively.

The total dropout was approximately 10% which was lower than expected dropout rate of 20% as considered during sample size calculation (Section 6.3). Thus, the power of study was maintained, and the results obtained represented the actual results in the studied population.

There was no significant difference of the demographic profiles between the study groups (p-value >0.05) except for pocket money (p-value <0.05) (Table 6.1). Hence, the latter

was used as the significant covariates in the subsequent analysis. Table 6.2 shows no statistically significant difference between the baseline scores between the control and intervention groups in terms of knowledge, attitude and intention to use. On the other hand, the scores were statistically different for refusal self-efficacy score.

Table 6.1

Comparison of Baseline Mean Scores of Knowledge, Attitude, Intention to Use and Refusal self-efficacy

Items	**Trial groups[a]**		***P*-value[b]**
	Control (n=108)	**Intervention (n=109)**	
Knowledge	6.7(2.00)	6.7(2.35)	.281
Attitude	48.5(6.88)	47.4(6.96)	.269
Intention to use	9.2(4.02)	9.7(3.76)	.351
Refusal self-efficacy	88.0(15.08)	71.2(18.46)	.003

a Values are expressed as mean(SD) unless otherwise specified
b Independent t-test

Table 6.2

Comparison of Baseline Demographic Data of Particiants for The Evaluation Study

Items	**Trial groups**		***P*-value**
	Control (n=108) n(%)	**Intervention (n=109) n(%)**	
Age (years)	11.0(0.96) [a]	11.0(0.21) [a]	0.101 [b]
Pocket money (RM)	5.4(2.19) [a]	4.7(1.60) [a]	0.009 [b]
Race			
Malay	108(100)	103(94.5)	0.047 [d]
Chinese	0(0.0)	1(0.9)	
Others	0(0.0)	5(4.6)	
Religion			
Islam	108(100)	104(95.4)	0.079 [d]
Buddhism	0(0.0)	1(0.9)	
Christianity	0(0.0)	4(3.7)	
Having household members using TP			
No	45(41.7)	46(42.2)	0.936 [c]
Yes	63(58.3)	63(57.8)	
Ever-used TP			
No	76(70.4)	84(77.1)	0.263 [c]
Yes	32(29.6)	25(22.9)	
Frequency of using TP among ever-used			
Once in a lifetime	19(59.4)	18(72.0)	0.283 [d]
> once in a lifetime	2(6.2)	4(16.0)	
At least once a year	2(6.2)	1(4.0)	
At least once a month	1(3.1)	1(4.0)	
At least once a week	4(12.5)	0(0.0)	
Everyday	0(0.0)	3(12.0)	

a Values are expressed as mean(SD) unless otherwise specified
b Independent t-test
c Pearson chi-squared test
d Fisher Exact test

6.7.2 Effectiveness of TUPY-S

The effectiveness of TUPY-S was evaluated with four dependent variables, namely, knowledge, attitude, intention to use and refusal self-efficacy, utilizing repeated measures ANCOVA controlled by pocket money. Effectiveness was analyzed at three aspects i.e. within group (time effect), between groups regardless of time (treatment effect), and time-group interaction.

a. Knowledge

i. Within group (time effect)

Table 6.3

Pairwise Comparison of Mean Scores for Knowledge Within Each Study Group [a]

Comparison	**Intervention**		**Control**	
	MD[b] (95% CI[c])	***p-value*[c]**	**MD[b] (95% CI[c])**	***p-value*[c]**
Baseline-week1	-1.330 (-1.984--.677)	<0.001	-.148 (-.674-.378)	>0.95
Baseline - week8	-1.817(-2.312--1.321)	<0.001	-.704(-1.231---.176)	.005
Week1-week8	-.486 (-1.042-.069)	.107	-.556 (-1.063--.048)	.027

Repeated measure ANCOVA within group analysis was applied followed by pairwise comparison with confidence interval adjustment.
Numerical covariates (pocket money) were controlled.
[a]Based on estimated marginal means
[b]The mean difference is significant at the .05 level
[c]Adjustment for multiple comparisons: Bonferroni
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
MD = mean difference
Within group (Intervention): F (df) = 6.044 (2), p-value <0.003

The repeated measure ANCOVA within group analysis showed that there was a significant increment of knowledge scores within the study groups (Table 6.3). Pairwise comparison results showed that there was highly significant increment of knowledge scores at baseline-week 1 and baseline-week 8 among the intervention group. In the control group, there were significant increment in knowledge scores at baseline-week 8 and week1-week 8. However, the level of significant was higher in the intervention group.

ii. Between groups regardless of time (treatment effect)

The repeated measure ANCOVA between group analysis showed that there was a highly significant difference in increment of knowledge scores between the study groups regardless of time (F(df)=13.231(1), p<0.001). Post-hoc analysis was not done as there were only two study groups.

iii. Time-group interaction

Repeated measure ANCOVA within-between groups analysis showed that there was a significant difference of mean knowledge scores among the study groups at different time intervals (Table 6.4). At the baseline, there was no significant difference of mean scores between the study groups as both group adjusted means were overlapping with 95% CI values of each other. At the week 1 and week 8, the intervention group demonstrated significant higher mean knowledge scores than the control group as their adjusted means did not overlap with the 95% CI of the control group.

Table 6.4

Comparison of Mean Scores of Knowledge Within-Between the Study Groups at Different Time Intervals.

Study group	**Time interval**	**Adjusted mean (standard error)**	**95% confidence interval**	
			Lower	**Upper**
Intervention	Baseline	6.731(.212)	6.314	7.148
	Week-1	8.088(.231)	7.632	8.544
	Week-8	8.544(.188)	8.174	8.914
Control	Baseline	6.651(.213)	6.232	7.070
	Week-1	6.773(.232)	6.314	7.231
	Week-8	7.358(.189)	6.986	7.730

Repeated Measure ANCOVA within-between group analysis was applied.
Numerical covariates (pocket money) were controlled.
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
Within-Between group: F (df) = 8.793 (2), p-value <0.001.

Thus, the research hypothesis was proven since there was significant increment of knowledge scores among the intervention group as compared to the control group, after controlling the covariate (pocket money). The increment of knowledge among the intervention was sustained for duration of 8-week post intervention. However, a lesser significant increment was also seen in the control group. These increments were illustrated in Figure 6.3.

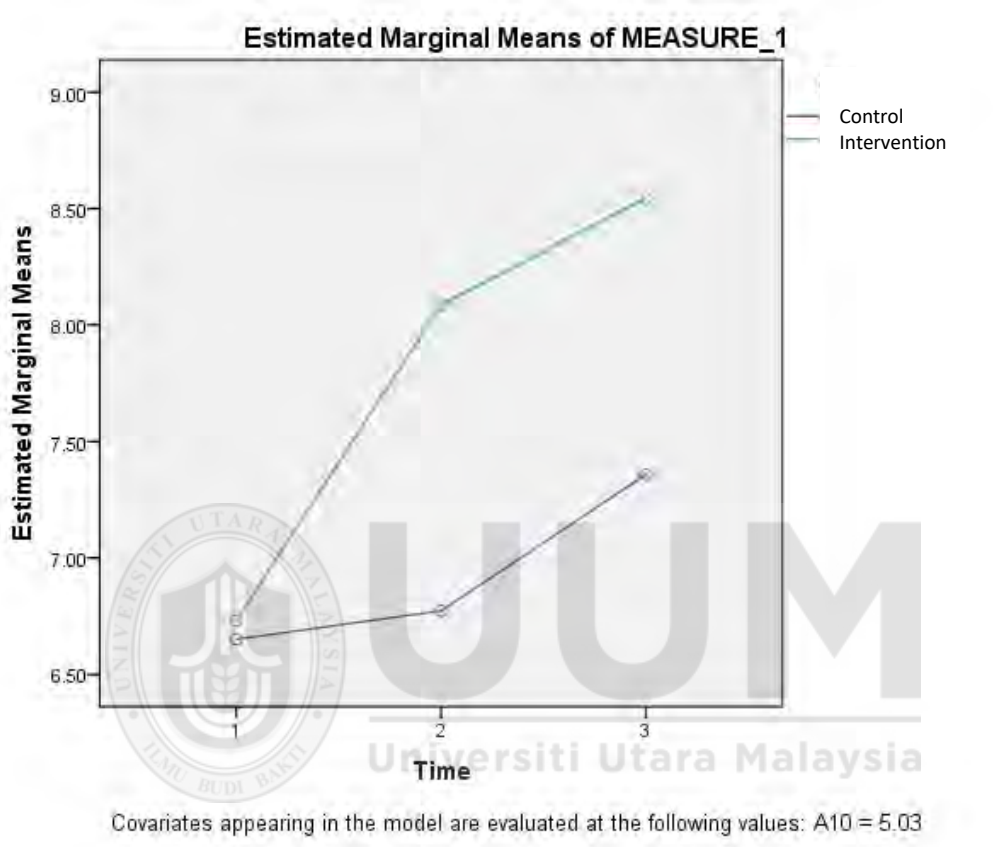

Figure 6.3 Comparison of mean scores for knowledge within-between study groups at different time intervals after controlling the covariate

b. Attitude

i. Within group (time effect)

Table 6.5

Pairwise Comparison of Mean Scores for Attitude Within Each Study Group [a]

Comparison	Intervention		Control	
	MD[b] (95% CI[c])	***p-value*[c]**	**MD[b] (95% CI[c])**	***p-value*[c]**
Baseline-week1	-.743 (-2.330-.844)	.772	-1.019(-2.574-.537)	.342
Baseline - week8	-1.055(-2.682-.572)	.353	.444(-1.315-2.204)	>0.95
Week1-week8	-.312(-1.806-1.183)	>0.95	1.463(-.246-3.172)	.703

Repeated measure ANCOVA within group analysis was applied followed by pairwise comparison with confidence interval adjustment.
Numerical covariates (pocket money) were controlled.
[a]Based on estimated marginal means
[b]The mean difference is significant at the .05 level
[c]Adjustment for multiple comparisons: Bonferroni
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
MD = mean difference
Within group(intervention): F (df) = 1.821 (2), p-value=.164

The repeated measure ANCOVA within group analysis showed non-statistically significant results (Table 6.5). Pairwise comparison results showed that there was increment of attitude scores at the baseline-week 1, week 1-week 8 and baseline-week 8 among the intervention group. On the other hand, in the control group, there was reduction in attitude scores. Hence, despite the statistically non-significant results, the findings were in favor with the intervention indicating elements of clinical importance.

ii. Between groups regardless of time (treatment effect)

The repeated measure ANCOVA between group analysis showed that there was no significant difference in change of attitude scores between the study groups regardless of time (F(df)= .257 (1), p<0.613). Post-hoc analysis was not done as there were only two study groups.

iii. Time-group interaction

Table 6.6

Comparison of Mean Scores of Attitude Within-Between the Study Groups at Different Time Intervals.

Study group	Time interval	Adjusted mean (standard error)	95% confidence interval	
			Lower	Upper
Intervention	Baseline	47.541(.667)	46.225	48.857
	Week-1	48.320(.662)	47.016	49.624
	Week-8	48.566(.723)	47.140	49.992
Control	Baseline	48.361(.671)	47.040	49.683
	Week-1	49.343(.665)	48.033	50.653
	Week-8	47.947(.727)	46.515	49.380

Repeated Measure ANCOVA within-between group analysis was applied.
Numerical covariates (pocket money) were controlled.
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
Within-Between group: F (df) = 1.733 (2), p-value=.178.

Repeated measure ANCOVA within-between groups analysis showed that there was no statistically significant difference of mean attitude scores among the study groups at different time intervals (Table 6.6). There was no significant difference of mean scores between the study groups as both groups adjusted means were overlapping with 95% CI values of each other.

Thus, the second research hypothesis was rejected since there was no statistically significant change of attitude scores among the intervention group as compared to the control group, after controlling the covariate (pocket money). However, the increment in attitude scores was apparent in the intervention group compared to the decrement in control group as illustrated in Figure 6.4. Hence, clinically important findings are shown.

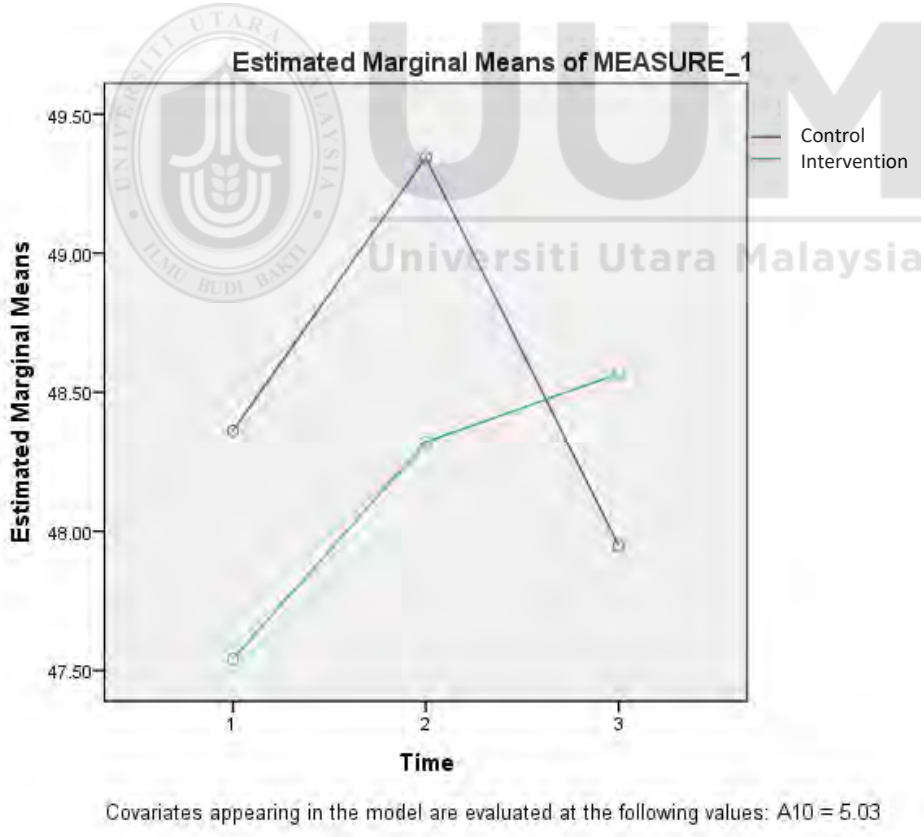

Figure 6.4. Comparison of mean scores for attitude within-between study groups at different time intervals after controlling the covariate

c. Intention to use

i. Within group (time effect)

Table 6.7

Pairwise Comparison of Mean Scores for Intention to Use Within Each Study Group [a]

Comparison	Intervention		Control	
	MD[b] (95% CI[c])	***p-value*[c]**	**MD[b] (95% CI[c])**	***p-value*[c]**
Baseline-week1	-.046(-1.006-.914)	>0.95	.102(-.679-.883)	>0.95
Baseline - week8	.339(-.614-1.292)	>0.95	-.056(-.960-.849)	>0.95
Week1-week8	.385(-.469-1.239)	0.825	-.157(-.937-.622)	>0.95

Repeated measure ANCOVA within group analysis was applied followed by pairwise comparison with confidence interval adjustment.
Numerical covariates (pocket money) were controlled.
[a]Based on estimated marginal means
[b]The mean difference is significant at the .05 level
[c]Adjustment for multiple comparisons: Bonferroni
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
MD = mean difference
Within group(intervention): F (df) = .403 (2), p-value= .669

The repeated measure ANCOVA within group analysis showed non-statistically significant results (Table 6.7). Pairwise comparison results showed that there was reduction in intention to use scores from baseline-week1, baseline-week 8 and week 2-week 8 among the intervention group. On the other hand, in the control group, there was increment in intention to use scores. Hence, despite the statistically non-significant

results, the findings were in favor with the intervention indicating elements of clinical importance.

ii. Between groups regardless of time (treatment effect)

The repeated measure ANCOVA between group analysis showed that there was no significant difference in change of attitude scores between the study groups regardless of time (F(df)=.130 (1), p<0.719). Post-hoc analysis was not done as there were only two study groups.

iii. Time-group interaction

Table 6.8

Comparison of Mean Scores of Intention to Use Within-Between the Study Groups at Different Time Intervals.

Study group	Time interval	Adjusted mean (standard error)	95% confidence interval	
			Lower	Upper
Intervention	Baseline	9.709(.376)	8.967	10.451
	Week-1	9.769(.398)	8.984	10.554
	Week-8	9.331(.401)	8.540	10.122
Control	Baseline	9.155(.378)	8.409	9.900
	Week-1	9.039(.400)	8.250	9.828
	Week-8	9.249(.403)	8.455	10.044

Repeated Measure ANCOVA within-between group analysis was applied.
Numerical covariates (pocket money) were controlled.
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was fulfilled, 3) Assumption of compound symmetry was fulfilled.
Within-Between group: F (df) = .844 (2), p-value=.431.

Repeated measure ANCOVA within-between groups analysis showed that there was no statistically significant difference of mean intention to use scores among the study groups at different time intervals (Table 6.8). There was no significant difference of mean scores between the study groups as both groups adjusted means were overlapping with 95% CI values of each other.

Thus, the third research hypothesis was rejected since there was no statistically significant change of intention to use scores among the intervention group as compared to the control group, after controlling the covariate (pocket money). However, the reduction in intention to use scores was apparent in the intervention group compared to the increment in the control group as illustrated in Figure 6.5. Hence, clinically important findings are shown.

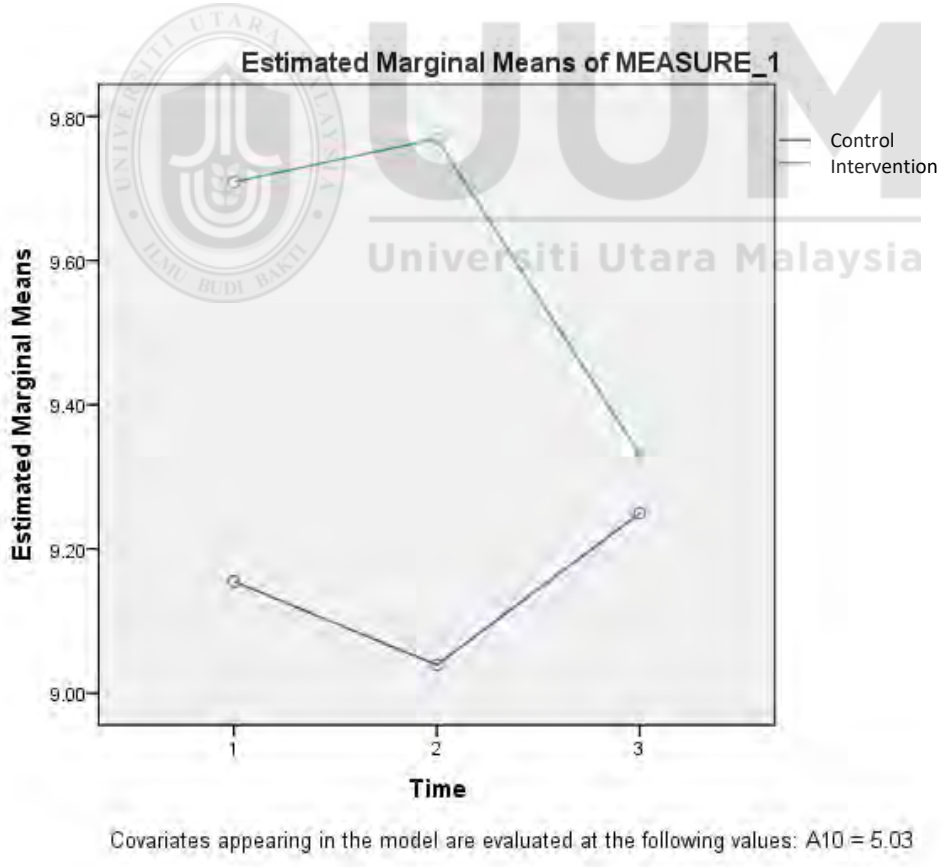

Figure 6.5. Comparison of mean scores for intention to use within-between study groups at different time intervals after controlling the covariate

d. Refusal self-efficacy

i. Within group (time effect)

Table 6.9

Pairwise Comparison of Mean Scores for Refusal Within Each Study Group [a]

Comparison	Intervention		Control	
	MD[b] (95% CI[c])	***p-value*[c]**	**MD[b] (95% CI[c])**	***p-value*[c]**
Baseline-week1	-6.266(-9.915--2.617)	<.001	-1.991(-5.080-1.099)	.360
Baseline - week8	-6.239(-10.556--1.921)	.002	-3.343(-6.914-.229)	.074
Week1-week8	.028(-3.403-3.458)	>0.95	-1.352(-4.833-2.130)	>0.95

Repeated measure ANCOVA within group analysis was applied followed by pairwise comparison with confidence interval adjustment.
Numerical covariates (pocket money) were controlled.
[a]Based on estimated marginal means
[b]The mean difference is significant at the .05 level
[c]Adjustment for multiple comparisons: Bonferroni
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was violated, 3) Assumption of compound symmetry was violated.
MD = mean difference
Within group(intervention): *F* (df) = 1.695 (1.849), *p*-value= .189 (*Greenhouse-Geisser*)

The repeated measure ANCOVA within group analysis showed that there was a highly significant increment of refusal self-efficacy scores within the intervention group at baseline-week 1 and baseline-week 2 (Table 6.9). In the control group, no significant results were seen in any of the levels.

ii. Between groups regardless of time (treatment effect)

The repeated measure ANCOVA between group analysis showed that there is significant difference in refusal self-efficacy scores between the study groups regardless of time (F(df)=4.891 (1), p<.028). Post-hoc analysis was not done as there were only two study groups.

iii. Time-group interaction

Table 6.10

Comparison of Mean Scores of Refusal Self-Efficacy Within-Between the Study Groups at Different Time Intervals.

Study group	Time interval	Adjusted mean (standard error)	95% confidence interval	
			Lower	Upper
Intervention	Baseline	71.411(1.627)	68.204	74.618
	Week-1	77.741(1.607)	74.573	80.910
	Week-8	77.411(1.741)	73.980	80.843
Control	Baseline	77.752(1.635)	74.530	80.974
	Week-1	79.678(1.615)	76.495	82.861
	Week-8	81.335(1.749)	77.887	84.782

Repeated Measure ANCOVA within-between group analysis was applied.
Numerical covariates (pocket money) were controlled.
Assumptions were checked: 1) Normality of residual was fulfilled, 2) Homogeneity of variances was violated, 3) Assumption of compound symmetry was violated.
Within-Between group: F (df) = 2.135 (1.923), p-value=.122. (*Greenhouse-Geisser*)

Repeated measure ANCOVA within-between groups analysis showed that there was no statistically significant difference of refusal self-efficacy scores among the study groups at different time intervals (Table 6.10). There was no significant difference of mean scores

between the study groups as both groups adjusted means were overlapping with 95% CI values of each other.

Thus, the fourth research hypothesis was rejected since there was no statistically significant change of refusal scores among the intervention group as compared to the control group, after controlling the covariate (pocket money). However, the increment in refusal self-efficacy scores was more apparent in the intervention group compared to the increment in the control group as illustrated in Figure 6.6. Hence, clinically important findings are shown.

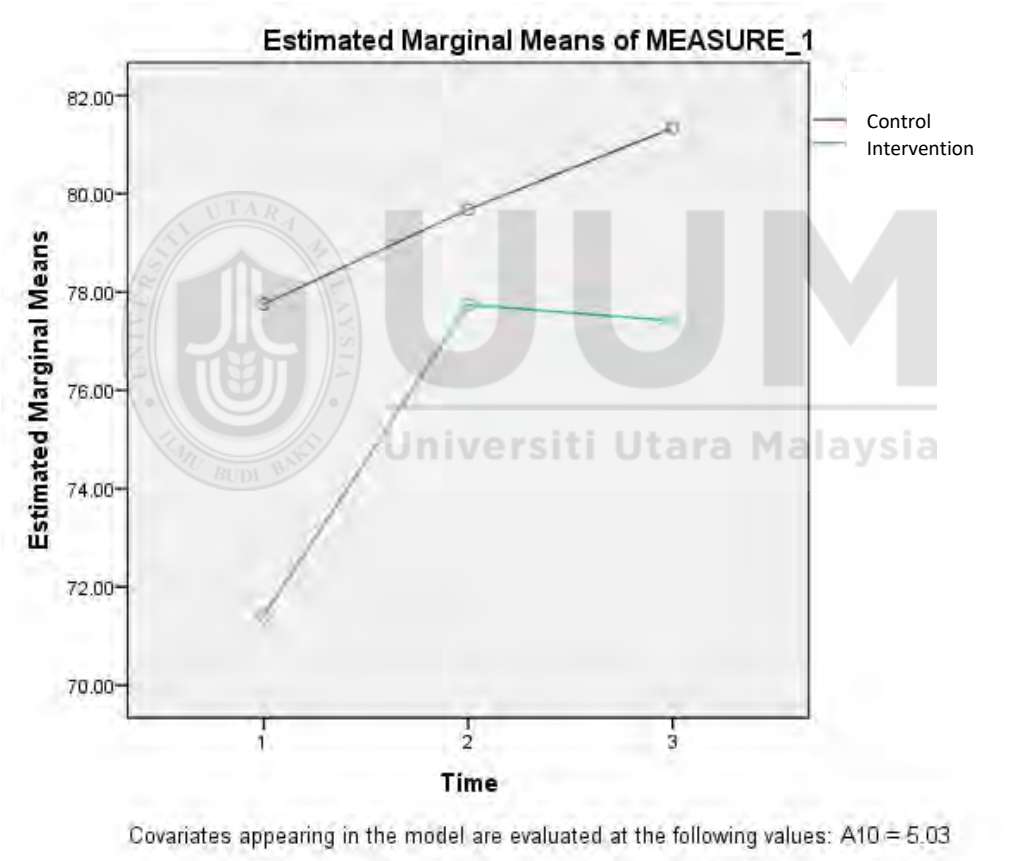

Figure 6.6. Comparison of mean scores for refusal self-efficacy within-between study groups at different time intervals after controlling the covariate

6.7.3 Conclusion

Phase-3 evaluated the effectiveness of TUPY-S among the early adolescents at substantial risk of using tobacco products in a two-armed quasi-experimental study. TUPY-S was proven to have significantly increased the knowledge on tobacco use among this group. Although the improvement in attitude and decrement in intention to use were not statistically significant, there were obvious positive changes seen in the mean scores. Conspicuous improvement in resilience were also observed as portrayed by increment in the self-efficacy refusal skill scores. Table 6.11 summarizes the research hypothesis and the results of the analysis. Hence, TUPY-S is ready to be used to prevent tobacco products use among early adolescents at substantial risk of using tobacco products living in Malaysia.

Table 6.11

Summary of Research Hypothesis and Test Results

Hypothesis		**Result**
H_{A1}	There is a significant change in mean scores of knowledge within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).	Accept

Table 6.1 continued

H_{A2}	There is a significant change in mean scores of attitude within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).	Reject
H_{A3}	There is a significant change in mean scores of intention to use within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).	Reject
H_{A4}	There is a significant change in mean scores of refusal self-efficacy within intervention group and control group at 1-week and 8-week post-intervention from baseline (Time effect), between intervention group and control group regardless of time (Group effect), and between intervention group and control group at 1-week and 8-week post-intervention from baseline (Time*Group effect).	Reject

CHAPTER SEVEN

DISCUSSION AND CONCLUSION

The purpose of this study is to develop and determine the effectiveness of an interactive multimedia tobacco product use prevention strategy (TUPY-S), for the early adolescents living in Malaysia. The full process utilized the modular instruction guideline by Russell (1974). A significant gap in the literature for tobacco use prevention strategies was explored in a qualitative study among the late adolescents. This chapter discussed and finally conclude the entire journey to develop and determine the effectiveness of TUPY-S.

7.1 Phase 1: Pre-Development

Russel (1974) outlined multiple essential steps before development of a module which include feasibility study, review of existing modules, specification of the objectives, identification of the construct criterion items, and learner analysis and entry behavior specification. This section discussed and conclude the need assessment which showed the gap in the existing tobacco use prevention strategies. The identification of item criterion which led to the development of Tobacco Use Prevention for the Young Questionnaire was also highlighted. The other steps in Phase-1 has been reported in Chapter-4.

7.1.1 The Need Assessment

The adolescents' perspective on the need, content and mode of delivery of an effective tobacco use prevention module was obtained through a qualitative research method which is particularly useful in exploring attitudes, views, beliefs, feelings and behavior.

Qualitative research is a popular non-experimental research method in many field especially social sciences. Moreover, this method is able to answer various kinds of research questions concerning issues and problems from multiple perspectives (Chua, 2012). The data was collected through focus group discussions. A semi-structured interview format was utilized to allow flexibility in the depth of the questions, use of local dialect and arrangement of the questions while maintaining the coherency in the content. In this type of interview, the issue of tobacco prevention from the adolescents' perspective was explored using a semi-structured interview format to ensure better understanding by the participants as the level of language can be modified when necessary during the process.

Focus group method is useful in collecting information about a specific issue from a group of participants who work together and who understand what each other are saying. It also allows more information to be obtained due to the feasibility of exchanging ideas and discussion (Chua, 2012). Moreover, FGD allows data to be collected among the illiterates, encourages those who are reluctant to be interviewed alone and those who has limited idea on the topic of the conversation (Kitzinger, 1995). Wong (2008) outlined a few other strengths for using FGD in healthcare and medical research owing to the social influence of illneses on one's environments and social context. FGD has been used in assessing one's experience and understanding of illness, iliciting ideas on health-risk behaviors, exploring perception on diseases, and investigating sensitive issues.

The adolescents in this study reported having peers and teachers who smoke tobacco, the widespread use of tobacco products and self-perception for being healthy, as the barriers for currently available tobacco prevention programs. Social normalization and modeling

due to the long existence of tobacco in the culture has long been recognized as a strong predictor to tobacco use among adolescents (Al-Sadat, Misau, Zarihah, Maznah, & Su, 2010; Bandura, 1977, 1986; Bidstrup et al., 2009; Menati et al., 2016; Schaefer & Haas, 2013; Sherman, Chassin, Sherman, Presson, & Macy, 2016). The effect of having teachers who use tobacco, as a barrier to the effectiveness of tobacco use prevention program, was also identified in a similar study among educational providers and staff (Tahlil, Coveney, Woodman, & Ward, 2013). Since the adolescents continue to use tobacco products despite the abundant availability of preventive programs, there seems to be some significant barriers which need to be addressed.

Among the essential contents of an effective tobacco use prevention program disclosed during the focus group discussions in this study include information on negative health outcomes, measures to deal with peer influence, religious education, negative economic impact, family value and parenting, legislation, self-efficacy, refusal skill, suggestion on alternative activities and stress management.

Information on the negative health outcomes has been included in all of the previous programs. Malaysian Ministry of Education (MOE) has been educating the school children on this aspect through the national curriculum for the primary schools starting from standard three (9 years old) and repeatedly until the secondary school (Jamaliyah et al., 2012; Mohamad, 2002; Sopia et al., 2013). All of the rigorously developed tobacco use prevention programs developed since the year 2000 included the knowledge on the negative health outcomes as an essential component in their program (Table 2.1-2.3). Although previous programs produced a mixture of outcome in terms of success,

knowledge on the negative health effects of using tobacco is an essential component in a prevention strategy.

All adolescents in this study agreed to the significant role of peers in influencing the use of tobacco products among the youth. The role of peer influence has been recognised as the most significant factor contributing to the use tobacco products for a long time. Peer influence comes from many angles. They could be actively persuading and provoking others or passively exist in the environment by producing social normalization of behaviour. According to the Social Learning Theory by Bandura, observational learning is the fundamental cause of smoking tobacco (Bandura, 1977, 1986). In the Theory of Planned Behavior, behavior is determined by behavioral intentions which is readily influenced by the subjective norms created by the family or friends' perception (Ajzen, 1991). The same view was explained by Jessor & Jessor (1977) through the Theory of Problem Behavior whereby tobacco use behavior is said to be a part of a system of psychosocial that influence one another. The parental and friend normative beliefs in approving the tobacco use behavior influence its initiation among the youth (Jessor & Jessor, 1977). A study by Tahlil, Woodman, et al. (2013) on exploring the educators and staff perception on the content of a prevention program reported the importance of teaching measures to avoid peer's influence, indirectly indicating that peer's influence is indeed a significant contributor to tobacco use among youth.

Apart from avoiding the perpetrator, among the measures to overcome peer's influence revealed by the adolescents in this study are to improve strengthening self-efficacy and refusal skill. Self-efficacy is a cognitive variable that refers to ones' beliefs regarding control over events in their lives (Bandura, 1977). Those with low self-efficacy are

unlikely to resist engaging in high risk behavior, whereas high self-efficacy individuals are more likely to resist such behavior. Importance of strengthening self-efficacy has been brought forward by the adolescents in this study. They believe that strong self-efficacy against the use of tobacco protects somebody from using tobacco product. The perception of the adolescents in this study seems to reflect the Social Learning Theory by Bandura (1977) who claimed low self-efficacy as a predictor of using tobacco product among those exposed to tobacco use by their family members or peers. Improving self-efficacy has been used as an outcome measurement in multiple studies on tobacco use prevention (Ausems et al., 2002; Chen et al., 2006; Lee et al., 2007; Mohammed et al., 2016; Norman et al., 2008; Shegog et al., 2005; Stigler et al., 2007; Turhan et al., 2017). Handayani et al. (2015) developed their intervention program exclusively on improving self-efficacy based on The Self-efficacy Theory by Bandura (1977), and proven to be effective in increasing the self-efficacy score at immediately post-intervention compared to the control group in a quasi-experimental study. The role of self-efficacy in tobacco use initiation changes overtime whereby a decrease over time is associated with tobacco use among adolescence (Hiemstra, Otten, de Leeuw, van Schayck, & Engels, 2011). Thus, it is essential to strengthen perceived self-efficacy which in turns would determine one's feelings, thoughts, self-motivation and behavior.

In order to overcome the active provocation from the tobacco users, all the adolescents in this study agreed to the need to teach the younger adolescents on improving refusal skill. Educators and staff also feels that teaching refusal skill is an essential component in a prevention program (Tahlil, Coveney, et al., 2013). Most studies on tobacco use prevention program includes refusal skill as the outcome measurement (Ausems et al.,

2002; Chen et al., 2006; Lee et al., 2007; Norman et al., 2008; Resnicow et al., 2008; Shegog et al., 2005; Stigler et al., 2007; Tahlil, Woodman, et al., 2013; Turhan et al., 2017). On the contrary, very few actually included teaching refusal skills in their intervention. According to Nichols, Birnel, Graber, Brooks-Gunn, and Botvin (2010), refusal skill strategies are divided into verbal or non-verbal. Verbal strategies include Simple No (just say ‘‘no’’), Declarative Statements (declare their anti-smoking conviction), Excuses (give an excuse why they can’t smoke), Alternatives (suggest an alternative activity to smoking) and Reverse the Pressure (reverse the pressure back onto the agitator by using sarcasm, insults, or challenges). Non-verbal skills include Assertiveness (firm, authoritative voice; speaking clearly and deliberately; direct eye contact; a serious and confident facial expression; and straight body posture, facing the confederate, creates an appropriate distance) and Effectiveness (effectively refuse the invitation in a real-life situation) (Nichols et al., 2010). The role of having a strong refusal skill is essential to prohibit tobacco use hence a crucial component to increase resilience among the youth against tobacco use.

Response on enquiries on the need to include religious education in the preventive strategy produced a mixture of responses among the adolescents in this study. Those from the rural area seem to appreciate the value of religion to prevent tobacco use more than those from the urban area. These findings are consistent with a study looking at the effectiveness of a religious tailored prevention program in Acheh whereby religious-based program alone produced insignificant reduction in intention to use smoked tobacco (Tahlil, Woodman, et al., 2013; Tahlil et al., 2015). On the other hand, the Elliott et al. (1985) postulated that attachments to conventional institutions including church are the

keys to prevent deviant behavior. However, the role of the religious place in prevention of tobacco use is unclear whether due to the religious teaching *per se* or the influence of the social normalization produced by the non-users. Therefore, the effect of integrating religious education is uncertain in improving the effectiveness of a tobacco use prevention program.

An effective mode of delivery is essential in ensuring a successful transfer of knowledge and skills to the target group. Responses to the question on how the information to prevent tobacco use be effectively delivered to the target group is consistent with our expectation from the current generation, the Generation-Z. Gen-Z are those who were born in or after 1990 which is known as the technology era (McCrindle, 2012). The members of this generation are unique since their birth coincides with the introduction of the internet making them internet searches and information technology (IT) literate. They would prefer to gain knowledge from the computers which would provide satisfactory live visuals and could interact with them (Geck, 2006; McCrindle, 2012). The adolescents in our study, being members of Gen-Z, suggested the use of video on the live evidence of the negative health outcomes from using tobacco products, interactive games, quiz, and video on refusal skills acted by real person. These facts agreed with the Social Inoculation Theory by McGuire (1961) which postulated that exposing oneself to weakened counterarguments triggers a process of counter-arguing, which eventually produce resistance to later, stronger persuasive messages. On the contrary, the education providers and staff believe teachers, health professionals and religious leaders should be delivering the program providers through lectures, seminars and counseling sessions on top of visual aids and interactive teaching methods (Tahlil, Coveney, et al., 2013).

Although interactive software and internet are not widely used in tobacco use prevention programs, it has been increasingly used in health education (Forsyth, Kennedy, & Malone, 2013; Hutton et al., 2011). The Malaysian Ministry of Health has recently made significant efforts in promoting health through the social media by using videos. On the other hand, almost all of the currently available rigorously developed preventive strategies are being delivered in schools (Table 2.1-2.3). Although there is no study to our knowledge comparing the effectiveness of education delivery between workshops and interactive software, the latter may produce a better result if the nature of the Gen-Z is taken into consideration.

The objective of this phase was to explore the adolescents' perception on effective strategies to prevent their younger counterparts from using tobacco products. All adolescents living in the rural and urban area including the current users, ex-users and non-users of tobacco agreed to the need to develop a new program for the younger adolescents. Barriers of the currently available prevention program notified by them are having peers and teachers who smoke tobacco, poor clarity of current programs, the widespread use of tobacco products and self-perception for being healthy. The content of the program should include knowledge on negative outcomes of using tobacco products, ways to overcome peer and family influence together with improving self-efficacy and refusal skill. The strategy was suggested to be delivered using information technology.

7.1.2 Identification of the construct criterion items: Development, validation and reliability assessment of TUPY-Q

TUPY-Q was developed for the evaluation of the tobacco use prevention strategy for the young (TUPY-S) in a quasi-experimental study. The development of TUPY-Q follows

the process of instruments construction and evaluation as summarized in Figure 4.1 (Streiner et al., 2014). The essential steps include generate items, scaling response, selecting the items (validation) and reliability. The need for variable and valid instruments was further demonstrated by Marshall et al. (2000) in a review of 300 clinical trial on Schizophrenia, whereby it is unlikely that the unpublished instruments are able to detect treatment effects. Unpublished instruments are those who were not developed according to certain rigorous procedure. Hence, Marshall et al. (2000) discourages researchers from using unpublished instruments in evaluating their clinical trial.

The items for TUPY-Q were generated from the factors commonly used in assessing tobacco use prevention programs in previos studies. It was successfully validated and reliable to be used among the early adolescents living in Malaysia. The knowledge and attitude items were developed from the content of each submodules of TUPY-S. The items for intention to use and refusal were adapted from a similar questionnaire used in Taiwan (Lee et al., 2007). Items from Lee et al. (2007) was forward translated by two experts to ensure high level of equivalence between the original mandarin and translated Malay version. Item relevancy towards the study objectives and the study population was considered in the review process. Since the translated version was seemed to be incoherent with the study population, the researcher chose to adapt the items instead of proceeding with backword translation. Originally, the refusal items were split into refusal skill and self-efficacy. However, following exploratory factor analysis (EFA), the two groups of items belonged to the same group and renamed as ‘refusal” in TUPY-Q. Hence, TUPY-Q with four domains, namely, knowledge, attitude, intention to use and refusal, was analysed for confirmatory factor analysis (CFA) using AMOS.

CFA measures the extent to which a measure relates to other measures, and consistent with the theoretically derived hypotheses on the concepts (or construct) that are being measured (Carmines & Zeller, 1979; Suhr, 2006; Thompson, 2004). The items were selected based on repeated process of modification using factor loading, correlation between domains and model fitting, together with content relevance (Thompson, 2004). The preliminary model of 71 items were loaded into four domains, and the final model with 49 items demonstrates acceptable factor loadings, domain to domain correlation, and best fit (χ2/df = 2.304; TLI = 0.783; CFI = 0.802; and RMSEA = 0.049).

The final evaluation of TUPY-Q is the reliability assessment. Chua (2013) defines reliability of a research measurement as the capability in obtaining identical values when the same scenario is repeatedly measured using the same scale. Among the methods used in ascertain reliability in quantitative research are the test-retest reliability method, split-half method and Cronbach's alpha internal consistency method. The later method was chosen in this study since it is the most widely used reliability estimator when there is abundant number of items in a scale (Trochim, 2006). TUPY-Q demonstrated a good constructs reliability for knowledge, attitude, intention to use, and refusal at 0.7, 0.7, 0.8 and 0.9. Hence, the construct reliability of TUPY-Q based on CFA and internal consistency based on Cronbach's Alpha support the suitability of the scales, which was not proven in previous similar studies (Lee et al., 2007; Tahlil, Woodman, et al., 2013). TUPY-Q is valid and reliable to assess knowledge, attitude, intention to use, and self-efficacy & refusal skill on tobacco use prevention among the early adolescents in Malaysia.

7.2 Phase-2: The Development, Validation and Reliability of Tupy-S

The Phase-2 of the study involves the development of the content (sequence instruction) of the interactive multimedia strategy to prevent tobacco use among the youth (TUPY-S), validation of the content by the experts and representatives of the target population, and the reliability assessment by a sample of the target population. A rigorous development of an effective modular instruction involves multiple comprehensive steps to ensure the ultimate objectives are reached. The content was developed from the adolescents' perspective and delivered using IT in Malay language. The content validity, done among six experts in the field and module development, was good at 86%. The students' tryout showed satisfactory face validity subjectively and objectively (85.5%) and high Cronbach Alpha reliability (0.91).

Development of the content of TUPY-S is an integration between the adolescent's perspective on an effective tobacco use preventive strategy and the relevant social theories. Some of its contents were adapted from currently available preventive activities conducted by the Malaysian Ministry of Education through the "Kelab Doktor Muda", and "Modul Kesihatan Reproduktif Remaja" by the Federation of Family Planning Associations, Malaysia. The content details of TUPY-S are outlined in appendix 8. Previous similar studies used many methods in establishing the content of the tobacco use prevention programs including the education providers' and policy makers' view, adaptation from previous strategies and social theories. Although abundant strategies have been developed globally, a culturally tailored program is in need. Tobacco use has long been connected to a disease of social culture as explained by multiple social theories

(Petraitis et al., 1995). The importance of considering one's culture, ethnic, and sociodemographic background in developing a tobacco use prevention strategy has been implemented in many studies and proven to be effective (Bowen et al., 2012; Ghrayeb et al., 2013; Melson, 2014; Mohammed et al., 2016; Nordin et al., 2017; Tahlil, Coveney, et al., 2013).

This study considered the adolescent's perspective in determining the content and mode of delivery. They were explored in a qualitative study through focus group discussions among the adolescents including the current users, ex-users and non-users (Zin et al., 2016). Among the recommendations for the content of the program are negative health outcomes, how to deal with peers' influence, religious education related to tobacco use, negative economic impact, family value, legislation, self-efficacy or resilient, refusal skill and to encourage alternative activities especially sports. Despite being the target group, the adolescents' view was contemplated in the development of very few previous studies developed in this millennium (de Jong et al., 2014; Park, 2017). Both studies have strong social theoretical foundations including the I-change model used in de Jong et al. (2014), and multiple theories used in Park et al. (2017). Intriguingly, both studies were delivered exclusively using IT similarly to ours. Significant reduction in intention to use tobacco products was observed in Park et al. (2017) at immediately post-intervention in a single-armed quasi-experimental study. However, the randomized control trial by de Jong et al. (2014) showed slightly higher smoking initiation at six months post-intervention.

The adolescents' in a preliminary study suggested the use of information technology (IT) as the medium of choice for the current era (Zin et al., 2016). They proposed the use of live pictures, live videos with interview with tobacco use related diseases affected

individuals, interactive games or quiz with rewards, and cartoons. The use of IT in health education and promotion is increasingly popular. IT was exclusively used as the delivery medium by a quarter of the tobacco use prevention studies in this millennium (Figure 2.1).

Translating TUPY-S into the Health Belief Model

Among the vast numbers of social theories have been used in tobacco use prevention strategies, the adolescents' perspective on an effective tobacco use preventive strategy seems to have agreed with the Health Belief Model (HBM) predominantly, with some additional values (Hayden, 2013; Rosenstock, 1990; Stretcher, Champion, & Rosenstock, 1997) (Figure 7.1).

The Health Belief Model (HBM) is a conceptual frame-work used to understand health behavior and possible reasons for non-compliance with recommended health action. It provides guidelines for health program development allowing planners to understand and address reasons for non-adherence to the recommendations. The HBM addresses four major components which influence health behavior, namely, perceived barriers of recommended health action, perceived benefits of recommended health action, perceived susceptibility of the disease, and perceived severity of the disease. In addition, there are modifying factors that can affect behavior compliance including media, health professionals, personal relationships, incentives, and self-efficacy of recommended health action. Tobacco use prevention program addressed several of the components on major reasons for non-adherence on the recommendations for tobacco use prevention. Several perceived barriers deter participant participation in health promotion programs. These include inconvenient program days and time, inaccessible location, lack of time and cost.

Being an interactive multimedia delivered strategy, TUPY-S was designed to address these common barriers to ensure sustainability.

The adolescents' in this study suggested strategies to overcome self-perception for being healthy will improve effectiveness of a tobacco use prevention module. According to the Health Belief Model, people are most likely to make health behavior changes when they perceive that the disease is serious and are less likely to practice healthy behaviors if they believe that the disease is not severe (Maddux & Rogers, 1998; Rosenstock, 1974). TUPY-S demonstrated the severity of the health effects of tobacco use in multiple of its submodules including the health effects of primary, secondary and tertiary smokers. The construct of perceived benefits is a person's opinion of the value or usefulness of a new behavior in decreasing the future risk of developing a disease. People tend to adopt healthier behaviors when they believe the new behavior will decrease their risk of developing a disease. In TUPY-S, the benefits of not using tobacco which include living a healthy life, avoiding tobacco related diseases and not harming others, were presented in the activity "Me Without Tobacco".

Peers plays a significant role in the use of substance among adolescents including tobacco. The influence is contributed through the modeling of behavior, social norms, and intentional offers to participate in the behavior (Urberg, Shyu, & Liang, 1990). The parental role in the same context has been discussed comprehensively in Shakya, Christakis, and Fowler (2012). On top of that, they demonstrated that a peer's engagement in substance abuse is strongly correlated with an increased probability of the adolescent initiating that same behavior. Furthermore, they showed significant increment in substance use among adolescents with substance-abusing.

In addition to the four beliefs or perceptions and modifying variables, the HBM suggests that behavior is also influenced by cues to action including events, people, or things. TUPY-S exposed the adolescents on how to overcome such cues especially on the way to say 'No' to using tobacco. Another variable recently added into HBM was self-efficacy. Self-efficacy is the one's belief in one's own capability to perform a behavior (Bandura, 1977). Thus, shaping such belief will enable to shape a behavior. Since one's belief could be changed by having knowledge and skills to avoid tobacco use, TUPY-S exclusively provides these elements.

Modifying variables included in HBM are age, sex, ethnicity, personality, socio-economics and knowledge. Since personality is shaped by one's background, the adolescents suggested accordingly as they stressed on good family and religious value as the positive factors contributing to the lesser intention to use tobacco. They also expressed that a good stress management and living a healthy lifestyle would add to the less intention to use tobacco. TUPY-S included activities focusing in these matters.

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In addition to the four beliefs or perceptions and modifying variables, the HBM suggests that behavior is also influenced by cues to action. Cues to action are events, people, or things that move people to change their behavior. TUPY-S exposed the adolescents on how to overcome such cues especially on the way to say 'no' to using tobacco. Another variable recently added into HBM was self-efficacy. Self-efficacy is the one's belief in one's own capability to perform a behavior (Bandura, 1977). Thus, shaping such belief will enable to shape a behavior. Since one's belief could be changed by having knowledge and skills to avoid tobacco use, TUPY-S exclusively provides these elements.

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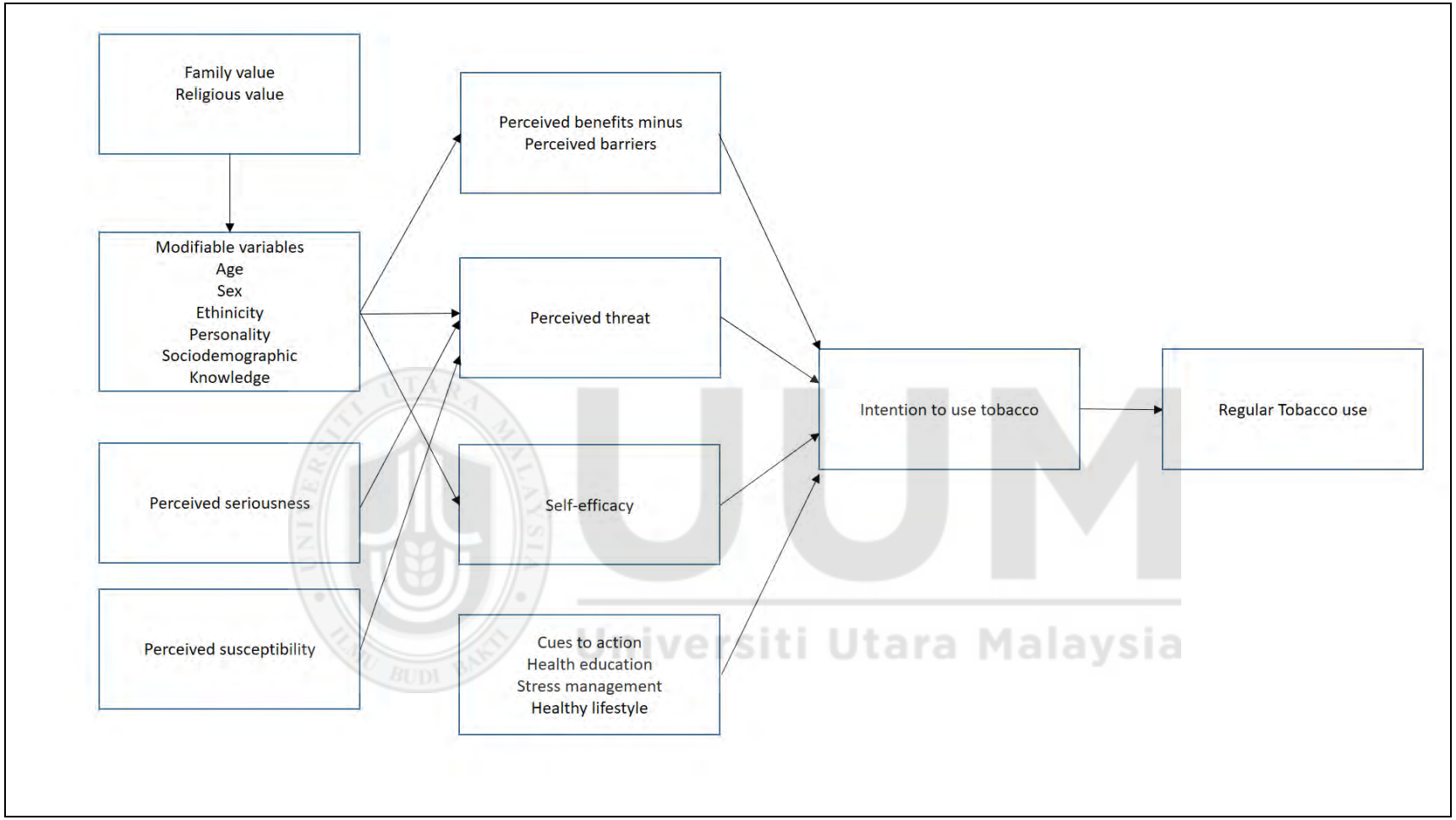

Figure 7.1. Modified HBM based on adolescents' perspective

7.3 Phase-3: The Evaluation of The Effectiveness of Tupy-S

Phase-3 aims to evaluate the effectiveness of TUPY-S among a sample of the target population. The outcomes parameters are knowledge and attitude on tobacco use, intention to use and refusal self-efficacy.

7.3.1 Research methodology

The effectiveness of TUPY-S was assessed in a school-based two-armed quasi-experimental study among male adolescents attending public daily school in the District of Kota Bharu, Kelantan.

Quasi-experimental study design has been utilised in multiple prior tobacco use prevention studies delivered using mixed IT with conventional (Koumi & Tsiantis, 2001; Sumartono et al., 2012; Turhan et al., 2017) and exclusively conventional (Chen et al., 2006; de Graaf et al., 2017; Handayani et al., 2015; Lee et al., 2007; Nordin et al., 2017). This study design allows a specific population to be chosen to participate in a study such as among the low-educated adolescents (de Graaf et al., 2017), or willingness of the participants (Koumi & Tsiantis, 2001). Moreover, it allows for logistic convenience (Shadish, Clark, & Steiner, 2008). This study design was utilized in our study due to the higher risk of using tobacco in the chosen area and to avoid contamination of the intervention among the control group if the schools chosen through randomisation are located at close proximity to each other.

On the other hand, since the study was conducted in an intact group and absence of randomisation, selection bias could occur readily leading to non-equivalent participants in the comparing groups. Measures suggested to overcome such negative effects in quasi-

experimental studies include using the logistic linear regression to collapse the covariates or a simple matching strategy as utilised in this study (Brooks, Chavez, Tritz, & Teasley, 2015). Following the latter strategy, the control and intervention groups in this study were matched equally in terms of demographics whereby both groups are composed of a well-established school (*Cluster School*), a school in military base and a school in rural area. Moreover, only male pupils in standard five were included in this study to allow coherency in social exposure and level of cognitive development.

According to the Ministry of Health of Malaysia, more than five million of population, aged between 6 and 19 years old, are registered to the schools under the government (Ministry of Education of Malaysia, 2016), hence, schools have become an important route to reach the adolescents. Furthermore, a focus on education on tobacco use prevention fits naturally with the daily activities of schools. School-based prevention strategy has dominated the ongoing efforts in controlling tobacco use, whereby only one study attempted to develop a community-based strategy in the past decade (Davis, Farrelly, Messeri, & Duke, 2009). However, the study by Davis et al (2009) contributes the first longitudinal evidence on the effectiveness of nationally aired campaigns with no baseline data could be obtained. The effectiveness of the intervention was evaluated by comparing three assessments of the outcome in three years. Despite the positive outcomes in intention to smoke and anti-smoking belief, the effects seen the study by Davis et. al. (2009) would not be caused by the intervention alone. Thus, a controlled environment, such as a school-based study, is very much more favourable and reliable in determining effectiveness of an intervention.

Furthermore, according to Eccles and Roser (2010), there are five major mechanisms on how school influences one's behaviour and development. Firstly, school-level resources and structures, whereby better outcome was seen in smaller schools. Secondly, school as a social organisation which allows better feasibility to organise beneficial programs, owing to the strong leadership, ability of all to participate, clear norm and rules, and sense of community. Thirdly, classroom level practices linked to academic outcome. Fourthly, classroom-level linked to psychological influences to motivation. Finally, schools lead to person environment fit. In conclusion, school influence individual at various levels and open up a window of opportunity to change one's behaviour.

Analysis showed that the baseline participant profiles between the intervention and control groups were equally distributed by mean age, race, religion, having household members using TP, ever used TP and frequency of use among the ever used (Table 6.1). Similarly, the baseline measurement of knowledge, attitude and intention to use between the study groups were statistically homogenous (Table 6.2). On the other hand, there were significant differences between the study groups for mean pocket money and baseline refusal score. Hence, pocket money was included as a covariate in the analysis of the outcomes. Since there was no statistically significant difference in majority of the baseline parameters, the study groups are comparable and homogenous. Furthermore, it indicates that the selection bias could be reduced despite the quasi-experimental design utilized in this study.

As reported earlier in Section 6.7, a total of 225 participants consented and were recruited into the study with 113 in the control group and 112 in the intervention group from six selected primary schools. However, eight of them were excluded at the end of the study

due to incomplete data due to missing follow up. Thus, 217 of them completed the study with total drop-out rate of 10%. The total dropout rate was far lesser than the anticipated figure of 20%. In clinical trial, dropouts are participants who fail to undergo the entire process of a study or lost to follow up. In our case, all the dropouts were due to health-related school absences. However, dropouts' rate of 20 percent or less is considered acceptable resulting in minimal bias and maintaining the quality of a study (NHLBI, 2014).

At the final stage of study, there were 109 participants in the intervention group and 108 in the control group. Although this number could be considered the lowest among the previous studies with similar design (Chen et al., 2006; de Graaf et al., 2017; Handayani et al., 2015; Koumi & Tsiantis, 2001; Lee et al., 2007; Sumartono et al., 2012; Turhan et al., 2017), except for Nordin et al.(2017) which involved only 120 participants in their pilot study, the sample size is considered adequate with power of 0.8 at 0.05 significance calculated for the highest value of parameters. The power of study is sufficient to detect detectable differences of the measured outcomes between the study groups (NHLBI, 2014). Hence, the results obtained would be accurate in revealing a statistically significant difference between the study groups when a difference truly exists (Edmonds & Kennedy, 2016).

7.3.2 Principal findings

Preventing tobacco use among the adolescents continues to be an ongoing effort in health care worldwide. The extensive use of information technology is a social norm of the current era. This study attempted to combine these two phenomena by using information technology to combat tobacco use among adolescents. Previous studies with similar

approach, exclusively using IT (Bowen et al., 2012; Brinker et al., 2017; Buller et al., 2008; Cremers et al., 2015; de Jong et al., 2014; Nădășan et al., 2016; Park, 2017; Rath et al., 2015; Shegog et al., 2005) and having components using IT (Ausems et al., 2002; Ghrayeb et al., 2013; Koumi & Tsiantis, 2001; Mohammed et al., 2016; Norman et al., 2008; Sumartono et al., 2012; Turhan et al., 2017; Verma et al., 2015), showed mixed outcomes. According to the modular instruction guideline by Russell (1974), a newly developed module should undergo a field test prior to its implementation. A field test is a process whereby a module is evaluated in terms of effectiveness on a group of target population and their performance is measured (Russell, 1974). On top of that, the procedure could be analyzed, and the module could be optimized to achieve its objective with the least expenditure of resources.

Phase-3 of the present study explored the short-term effects of a multimedia interactive tobacco use prevention strategy (TUPY-S) on male early adolescents at risk of using tobacco product, in terms of knowledge, attitude, intention to use and refusal self-efficacy, at week-1 and week-8 post intervention. Globally, positive effects were demonstrated in all components whereby TUPY-S is capable to increase tobacco related knowledge score, improve tobacco related attitude score, reduce intention to use tobacco products score and increase resilient as shown by increment in refusal self-efficacy score.

a. Increment of tobacco related knowledge score

In this study, a significant change in knowledge score between intervention group and control group at week-1 and week-8 post-intervention from baseline was observed. The items for knowledge in TUPY-Q was developed according to the objective of each submodule in TUPY-S (Appendix 3 & 8). The knowledge for score was determined by

the number of correct answers given by the participants. The higher the score indicates higher level of knowledge. Analysis using repeated measures ANCOVA with pocket-money controlled as co-variate, showed statistically significant difference in increment of knowledge in the intervention group compared to the control group at three aspects i.e. within group (time effect), between groups regardless of time (treatment effect), and time-group interaction. Knowledge has been an important outcome and proven to be significant statistically in many previous tobacco use prevention studies on effectiveness delivered either exclusively through IT (Shegog et al., 2005), mixed IT and conventional (Ghrayeb et al., 2013; Koumi & Tsiantis, 2001; Verma et al., 2015), or exclusively conventional (Kolovelonis et al., 2016; Lee et al., 2007; Nordin et al., 2017; Stigler et al., 2007; Tahlil, Woodman, et al., 2013).

An IT using tobacco use prevention strategy, conducted in Bangalore, India for the grade 10 students (aged 15 to 16 years old), showed a significant increment in the knowledge score Verma et al. (2015). Apart from information on the prevalence of tobacco use in adolescents, the content of their intervention was similar to this study, whereby the attitudes of adolescents towards tobacco use, the 'benefits' of tobacco use, health effects of tobacco, and economical consequences were emphasized. Similar to ours, the knowledge score was assessed at pre-intervention and one-week post-intervention. On top of having an study participants, Verma et al. (2015) utilized a single armed intervention study which is lacking in control group, thus the effect of increment of knowledge seen solely due to their intervention is questionable. On the other hand, the effect of increment in knowledge in this study could be considered as the result of TUPY-S per se as comparison was made with a control group. On top of that, this study assessed

the effects after a longer duration of follow up, whereby, a longer duration of effectiveness could be assessed hence showing a more sustainable result. Another single-armed intervention study by Shegog et al. (2005) showed significant increment of knowledge at immediately post-intervention. The efficacy of their intervention was evaluated among similar aged group i.e. 10 to 12 years old. Likewise, their self-directed intervention was delivered in a single session up to 50 minutes.

Ghrayeb et al. (2013) chose knowledge as one of their outcome measures in an intervention study to determine the effectiveness of a tobacco use prevention program for the youth in Pakistan. The intervention was culturally tailored curriculum consisted of five sessions with 45-minutes spent for each session, with each educational session lasted approximately 45 minutes. The delivery medium was a powerpoint presentation by a facilitator and printed materials. A Greek quasi-experimental study by Kuomi (2001), on the effectiveness of tobacco use prevention strategy delivered using audiovisual materials, showed significant difference in knowledge score in favor towards intervention group. The knowledge was assessed prior to, immediately after and 3 months after the intervention. Drawings and group discussion were the other components of the intervention. Although significant difference in increment of knowledge score was shown between the intervention and control group, the programs were resources consuming especially in terms of time and human. Being a self-administered interactive module, TUPY-S was administered in less than an hour among the participants independently. Despite the much lesser contact time and minimal need of supervision, similar outcome was seen in this study, resulting in a more cost-effective tobacco use prevention program.

Among the exclusively conventional delivered tobacco use prevention programs available in the literature since the year 2000, six of them measured the change in knowledge in assessing the effectiveness of their programs (Kolovelonis et al., 2016; Lee et al., 2007; Nordin et al., 2017; Ratneswaran et al., 2015; T. M. Smith et al., 2008; Stigler et al., 2007; Tahlil, Woodman, et al., 2013). Although statistically significant results were seen for the difference in knowledge score in time-group interaction in studies with control group and within group among the single-armed studies, the interventions in these conventional studies are extremely resources demanding. All the interventions involve multiple formal sessions in need of a trained facilitator and significant amount of contact time. On the other hand, with the contact time of less than one hour and minimal need for supervision, TUPY-S showed highly significant increment in knowledge score within the intervention group, and group effects together with group and time when compared to the control group.

b. Increment of tobacco related attitude score

In this study, an increment of mean attitude score was seen at week-1 and week-8 from baseline (Figure 6.4). On the contrary, despite the increment at week-1 from baseline, the mean attitude score among the control group declined from week-1 to week-8. Although the increment was not statistically significant within group (time effect), between groups regardless of time (treatment effect), and time-group interaction, a clinically significant positive impact was clearly observed in the intervention group. The items for attitude in TUPY-Q was developed according to the objectives of each submodule in TUPY-S (Appendix 3 & 8). The attitude score was determined by the summation of score for each item. The higher the score indicates higher level of attitude. Positive results were seen in

similar intervention studies delivered exclusively using IT (Bowen et al., 2012; Cremers et al., 2014; Rath et al., 2015; Shegog et al., 2005), mixed IT and conventional (Ausems et al., 2002; Koumi & Tsiantis, 2001; Mohammed et al., 2016; Verma et al., 2015) and exclusively conventional (Chen et al., 2006; de Graaf et al., 2017; Kolovelonis et al., 2016; Koumi & Tsiantis, 2001; Lee et al., 2007; U. G. Lee, 2012; Resnicow et al., 2008; Tahlil, Woodman, et al., 2013; Tahlil et al., 2015).

Cremers et al. (2015) assessed attitude score in assessing the effectiveness of a web-based computer-tailored tobacco use prevention strategy and found similar result as TUPY-S. An increment in the attitude observed at 12-month and 25-month post-intervention were not statistically significant. The similarity would have been contributed by the similar age group, 10 to 12-year old, and delivery entirely using IT. Their results contributed a long-term evidence of effectiveness while TUPY-S on the short-term. Hence, both results seemed to have complimented each other. From the Cremers' study, participants were seen to repetitively visit the website over the two years, hence the same outcome would be anticipated from TUPY-S. Moreover, due to the self-directed nature of TUPY-S, the feasibility of repetitive exposure is ensured.

Significant improvement in attitude was seen in three intervention studies which utilized IT as their mode of delivery (Bowen et al., 2012; Rath et al., 2015; Shegog et al., 2005). The effectiveness of interventions, in both Rath et al. (2015) and Shegog et al. (2005) were evaluated in a single-armed study, at up to three months and immediately post-intervention respectively. Despite the statistically significant results obtained, the effects could not be assumed to be entirely due to the intervention, owing to the lack in control group to allow direct comparison with a similar population. However, Bowen et al (2012)

managed to achieve significant improvement in attitude at month-1 post intervention among 226 participants in a randomized control trial. The most obvious advantage in their program compared to ours is the repetitive nature of the delivery. In their study, the participants were exposed to a web-based intervention (SmokingZine) for one hour a day over six weeks. Hence, there is significant discrepancy in duration of exposure compared to ours whereby the participants were exposed for less than an hour.

The need for a repetitive exposure is further approved by Verma et al. (2015) whereby significant improvement in attitude score was seen at 1-week post-intervention as compared with pre-intervention. The intervention was held in two sessions at six months apart. However, the significant effect was debatable as to have been caused by the intervention per se since there was no control group included in their study. Moreover, older aged of participants compared to ours, 15 to 16-year old, would have contributed to the statistically significant results due to the more advanced cognitive development in theirs (Santrock, 2012). Furthermore, multiple methods of delivery used in their study, including audiovisual and interactive session with facilitator, allows repetitive of similar information given to the participants and consequently improves their understanding and memory (Santrock, 2012). On the other hand, the need for a facilitator defeat the purpose of eliminating the need for a human resource in executing a module delivered using IT.

Conventionally delivered strategies showed more promising results with significant time-group interaction deference in favor of intervention groups at immediately after (Kolovelonis et al., 2016; U. G. Lee, 2012), week-1 (Lee et al., 2007; Tahlil, Woodman, et al., 2013), month-3 (Koumi & Tsiantis, 2001) and month-6 (Tahlil et al., 2015). Non-statistically significant increment in attitude score was also seen in (Chen et al., 2006; de

Graaf et al., 2017; Resnicow et al., 2008). The most appealing factors which could have contributed to the contradicting results to our study are the multi-sessions nature of these interventions and the opportunity for a direct discussion with the providers. Among the conventionally delivered interventions with statistically significant results reviewed, the minimum number of sessions reported was six over two months period (Lee et al., 2007) and maximum of 14 sessions over a year (U. G. Lee, 2012). Repetitive exposure to the content provided a constant reminder on the prevention message, hence, memory on the content was strengthened resulting in significant improvement in attitude. However, ensuring sustainability would be a challenge in these types of intervention due to its labor intensiveness and time consuming. On the other hand, a self-delivered interactive module would be able to overcome these barriers while ensuring sustainability.

Interestingly, this study observed an unexpected reversed finding in term of attitude score in the control group (Figure 6.4). The continuous social exposure from the environment, leading to development of a social norm as explained by the Social Learning Theory would be the most reliable explanation (Akers et al., 1979; Bandura, 1977). The schools participated in this study were selected based on the higher prevalence of smoking as compared to other schools in the district. Using tobacco products have been the norm among the adolescence in the area. The change in thought process of the children as they enter adolescence age together with the continuous exposure, changes their attitude towards using tobacco products (Akers et al., 1979; Bandura, 1977; Petraitis et al., 1995). Although these children were exposed to the standard education curriculum with many other tobacco use preventive activities in the social media, these efforts seemed to unable to influence the attitude of the early adolescence. Hence, a more comprehensive,

multidimensional, culturally tailored to suit the current generation as proposed by TUPY-S would be an appropriate move.

c. Reduction of intention to use score

Intention is the precursor for developing a behavior (Ajzen, 1991; Ajzen & Fishbein, 1980). Reducing intention to use tobacco products would result in a lesser likelihood to engage into this social misadventure. The latest version of Health Belief Model by Rosenstock et al. (1988) suggested efforts to prevent health behaviors should focus to improve the likelihood to engage in health promoting behavior and become the main objective of a prevention program. Intention to use has been used in many tobacco use prevention strategies available in the literature. In this study, although the values were not statistically difference, a clinically significant difference between the intervention and the control groups was clearly observed (Figure 6.5). Hence, TUPY-S could reduce the intention to use score among the early adolescents at risk living in Kelantan as compared to the increasing intention in the control group.

Similarly, despite the statistically insignificant findings, positive results were seen in multiple prior studies in assessing the effectiveness of prevention program in terms of intention to use: exclusively IT delivered (Buller et al., 2008; Cremers et al., 2015; Rath et al., 2015), mixed IT and conventional strategy (Ausems et al., 2002; Koumi & Tsiantis, 2001; Mohammed et al., 2016; Sumartono et al., 2012; Turhan et al., 2017), and conventionally delivered strategies (de Graaf et al., 2017; Tahlil, Woodman, et al., 2013; Tahlil et al., 2015). Both Buller et al. (2008) and Cremers et al. (2015) used the internet as the medium to deliver repetitive input on their programs, whereas Rath (2015) used video games in their single-armed intervention study. The study population in Buller et

al. (2008) was slightly older than TUPY-S. The intervention involved 73 online activities in six regular class meetings lasted up to 60 minutes per session. The much lesser activities included in TUPY-S would increase the feasibility of intervention to be conducted in school setting. The population and intervention style of Cremers et al. was similar to TUPY-S, but a longer duration was given to participants with and without prompting as a reminder to undertake the program. The target population was the early adolescents aged 10 to 12 years old and self-directed approached was used. They could sustain a long-term effect at two years post-intervention. Thus, a similar outcome could be anticipated in our study.

Sumartono et al. (2012) examined the effectiveness of their tobacco use prevention strategy by using the intention to use tobacco products in 20 years as the measurement tool. Despite being statistically insignificant, positive result was found to be in favor of the intervention group. However, more effort was used in their intervention since both IT and conventional methods were utilized and delivered in two sessions of one hour in duration. Although TUPY-S did not examine the intention to use after 20 years specifically, the last question on intention to use after form five used in this study would indicate the same meaning. Since we were able to produce similar efficacy in this self-directed and exclusively IT delivered strategy over less than one hour, TUPY-S is certainly a more resource-effective effort.

Significant positive results in reducing intention was seen in exclusively IT delivered strategies (Bowen et al., 2012; Buller et al., 2008; Park, 2017; Rath et al., 2015; Shegog et al., 2005). Similar to TUPY-S (Zin et al., 2017), intervention by Park (2017) was developed by the adolescents in a youth summer camp in a qualitative study. Moreover,

the effectiveness of both studies was evaluated among the 11 years old in a single-armed study by Park (2017) and quasi-experimental in TUPY-S. On the contrary, although the validity and reliability of TUPY-S were satisfactory, TUPY-S failed to produce statistically significant outcome in terms of intention to use tobacco product. Clinically significant improvement in intention to smoke score was also seen in single-armed intervention studies by Shegog et al. (2005), and a randomized controlled trial by Bowen et al. (2012).

Two possible explanations to the superiority of the studies by Park et al. (2017) was the single-armed study design and the multiple exposures of the interventions. Eight twice-weekly sessions were done by Park et al. (2017). In a single armed study design, the improvement of outcome score is compared within group alone, hence statistically significant change would be more likely to be observed compared to a two-armed study whereby significant changes have to occur within and between groups in time-group interaction. Moreover, multiple sessions used in their study would improve understanding and ensure more long-lasting outcome.

Mixed IT and conventional strategies (Koumi & Tsiantis, 2001; Mohammed et al., 2016), and exclusively conventionally delivered strategies (Bate et al., 2009; Lee et al., 2007; Perry et al., 2009; Stigler et al., 2007) showed statistically significant change in the intention to use score in favor with the intervention groups in their study. Randomized controlled trial with significantly larger sample size of 1381 and 8369, participated in Mohammed et al. (2016) and Project MYTRI by Bate et al. (2009), Perry et al. (2009), Stigler et al. (2007) respectively, would have contributed to the statistically significant results in their study. Despite the use of the same research design and time of post-

intervention assessment, both Koumi and Tsiantis (2001) and Lee et al. (2007) observed a more desirable result than TUPY-S. The probable contributing factors include multiple sessions of intervention leading to better comprehension on the content, and better cognitive function of the older age of participants.

Unpredictably, there was worsening of intention to use among the control group in this study. On the other hand, improvement of the intention is suspected since the schools were receiving tobacco use prevention programs through the formal education curriculum and extra-curriculum activities together with the mass media. Similar findings were seen in Tahlil, Woodman, et al. (2013) among their control group at week-1. We suspect the same reasons as the contradicting findings in the attitude i.e. due to the social norm created by the high prevalence of tobacco use in the environment.

d. Increment of refusal self-efficacy score

Refusal and self-efficacy have been considered as separate entity in some studies and otherwise the same entity in some. Construct validity, exploratory and confirmatory factor analysis, of TYPY-Q used in this study had grouped the items in the refusal skills and self-efficacy into one factor, refusal self-efficacy. In this study, the effects of the intervention on the refusal self-efficacy were not statistically significant in terms of within group (time effect), and between groups regardless of time (treatment effect) and time-group interaction when compared with the control group. However, the increment in refusal self-efficacy scores was more apparent in the intervention group compared to the increment in the control group as illustrated in (Figure 6.6). Hence, clinically important findings are shown. On top of that, we observed a few salient findings in this aspect: firstly, the baseline scores were statistically significant between the study groups;

secondly, in the intervention group, the increment in the mean score from baseline to week-1 was more prominent compared to week-1 to week-8; and finally, there were increment in the score among the control group.

The favorable findings in TUPY-S could have been contributed by the use of a self-directed interactive multimedia mode among a group of younger adolescents. Similar to TUPY-S, a non-statistically significant moderate increment in the refusal self-efficacy score was observed in Turhan et al. (2017), Mohammed et al. (2016) and Resnicow et al. (2008) among slightly older adolescents (12 to 16 years old) compared to TUPY-S (11 years old). Turhan and Mohammad used a mixture of IT and conventional methods of delivery in their tobacco use prevention strategy. Moreover, the content was delivered in five to eight sessions of 45 to 50 minutes. In another study, perceived refusal skill was used by Resnicow et al. (2008) in assessing their culturally tailored, exclusively conventionally delivered, tobacco use prevention strategy. Non-significant results were reported at post-intervention in this randomized controlled study among an older group of adolescences compared to TUPY-S. Hence, TUPY-S can be considered superior since a similar outcome was achieved in a single session of the same duration. Moreover, we managed to sustain the increment until week-8 post-intervention. However, comparison could not be made with Turhan and Resnicow as no evaluation made beyond immediately post-intervention was reported in their study. On the other hand, Mohammed was able to show positive outcome at six-month post-intervention of 8 sessions.

Shegog et al. (2005) achieved a statistically significant result in improving the refusal self-efficacy score among their participants in a single-armed intervention study at

immediately post-intervention. A few advantages were observed in their study in producing a statistically significant result. Firstly, the study design allowed evaluation of improvement within group since there is no control group. Hence, there is higher chance of getting a significant result from the statistical analysis. However, TUPY-S is more powerful in ensuring the effects were more likely caused by the intervention owing to the existance of a control group. Secondly, the evaluation was done immediately at the end of the intervention. Thus, immediate impulsive effects are bound to have occurred which does not produce any guarantee for sustainability. Longer affects were evaluated in our study, hence, would be more reliable in showing sustainability. Thirdly, large sample size which would increase the likelihood of yielding significant result in statistical analysis. Although a much smaller number of participants were involved in TUPY-S, the statistical power of the study was adequate based on the sample size calculation.

Statistically significant positive results were observed in tobacco prevention studies in four neighboring countries by Chen et al. (2006) in China, Handayani et al. (2015) in Indonesia, Lee et al. (2007) in Taiwan and Stigler et al. (2007) in India. Only Stigler et al. (2007) used a randomized control trial while the others used quasi-experimental design similar to our study. Larger number of participants in Chen et al. (2006) (n=381), Lee et al. (2007) (n= 469) and Stigler et al. (2007) (n=8369) could have contributed to a higher chance of getting statistically significant results. Since refusal self-efficacy requires some degree of self interpretation, more favorable results are expected among the older aged adolescents, 12 to 14 years old in their study compared to 11 in ours, due to better comprehension in understanding abstract and hidden messages. On top of that, intensive multi-sessions nature of more than five over a longer period would have been the main

contributor of the significant positive results. However, TUPY-S was developed to overcome the need of a comprehensive, labor intensive and time-consuming tobacco use strategy. The positive results achieved in this study would ensure sustainable and statistically significant results if attempted repeatedly, which is feasible due to the self-directive and interactive nature of TUPY-S.

7.4 Study limitations

There are multiple variables outside the scope of this study which may influence the outcome;

i. Normalization of tobacco use behavior by family members or community.

Some of the participants may have family members who are using tobacco or living in a society where tobacco use is perceived to be an acceptable social act. Moreover, some of them might be living in a community whereby tobacco is an important source of income. The continuous exposure results in development of a social norm and perception which influence the attitude of some participants but not the other leading to inequality in acceptance of the importance of behavior change related to tobacco use. In order to reduce these effects, participants were purposively chosen from two areas in a district with similar high risk to use tobacco products, to ensure a homogenous of the social background.

ii. Personal testimony or knowledge

Some participants may have personal experience with family or friends affected by tobacco in a negative way such as cancer or other related illnesses including heart disease. Furthermore, they may have had own current knowledge of the topic through either personal experiences or readings. These underlying ideas on tobacco lead to

discrepancies in perception and acceptance on new knowledge among the participants and consequently affecting the results of the study. The quasi-experimental design of the current study worsened these effects. However, the calculated sample size for our participants has the adequate statistical power to show five percent difference between the study groups. Moreover, the chosen schools have similar socio-demographic background whereby each study group has a school from rural area, one located in a military based and one 'cluster' school. Thus, we could assume that the perception and acceptance are comparable between the two groups and statistically proven in the baseline scores of knowledge, attitude and intention to use (Table 6.1).

iii. Peer influence

Participants might have been influenced by a group of peers who may or may not be using tobacco products or experimenting with tobacco during the duration of the study. As a result, participants' perception may be affected, and some may experiment tobacco hence the knowledge, attitude, intention and refusal self-efficacy would have changed. Although true-experimental study is assumed to be the best to exclude the influence of external factors on the outcome, a well-designed quasi-experimental study would be able to minimize this unavoidable effect as discussed in Section 7.3.

iv. The cognitive ability of adolescents

The brain development and cognitive ability of the under aged varies significantly, leading to variability in comprehension which would affect the outcome of the study. Hence, the study population varies according to objective. In Phase-1, the adolescents' perception was explored in a qualitative study which requires the ability to generate ideas and abstract thinking. Naturally, the cognitive ability is enhanced approaching adulthood

during the late adolescence age, thus, the late adolescents were chosen as the study participants. Although every effort will be made to obtain true response from the respondents, one could never be sure of such transparency in the response given. It will be very challenging to ascertain that the responses given by the respondents are not influenced by peers' perceptions especially among the adolescents. Their ability to comprehend and verbalized may also be disputable. On the other hand, the early adolescents were chosen to assess the effectiveness in Phase-3 to accommodate with the general objective of this study in developing a tobacco use prevention strategy.

7.5 Strengths of the Study

This study exhibits several strengths which lifted its quality and enhancing its contribution into the current literature;

i. A mixed methodology study

TUPY-S was developed following the extensive steps of a modular instruction development by Russell (1974) as outlined in Figure 3.1. In order to reach its comprehensive research objectives, a mixed methodology research design was utilised. A qualitative design was used in the pre-development stage of TUPY-S in Phase-1 of the study, while a quantitative quasi-experimental design used in determining the effectiveness in Phase-3 of the study. A mixed methodology study allows data to be integrated and provides a better understanding of a problem while producing a more comprehensive outcome. For instance, in this study, the need assessment and the content of TUPY-S was investigated in the qualitative phase and the products was tested in a quantitative study. A qualitative study enables a subject to be discussed in depth freely while improving its construct validity. On the other hand, an experimental study provides

a more objective way to evaluate a product especially among the younger population. Hence, a mixed methodology study would allow both methods to complement each other.

ii. Population and sampling

Despite the purposively selected study participants which would allow for bias in the selection process, this sampling method enable a specific population with the required criteria to be included in a study. In Phase-1, the late adolescents were purposively chosen to ensure adequate results for our first objective through a focus group discussion. Whereas, in Phase-3, the early adolescents were purposively chosen to achieve our objective number four in determining the effectiveness to suit the target population of TUPY-S. Furthermore, although there is a high risk of selection bias in Phase-3, the selected participants in the control group were comparable to the intervention group socio-demographically and statistically. Moreover, a proper sample size calculation was executed for Phase-3. Hence, comparisons between the two study groups could be made with the least bias and the difference in the outcomes measured were valid at appropriate power of study.

iii. Outcomes of the study

In Phase-3 of our study, we measured the effectiveness of TUPY-S using TUPY-Q with the domains of knowledge, attitude, intention and refusal self-efficacy. These domains are commonly used in prior intervention study in determining the effectiveness of tobacco use prevention programs. Therefore, direct comparison was attainable.

7.6 Recommendations

TUPY-S was comprehensively developed to prevent tobacco product use among the adolescents. Despite the statistically significant result was obtained only in terms of increment in knowledge, favourable outcomes were achieved throughout the entire process. Herewith, several recommendations are proposed;

i. Methodology of the study

A mixed methodology study design enables us to achieve the objectives of developing a modular instruction module following Russell (1974). The product, TUPY-S, has comparable content to available strategies with several added values. It also was proven to have high validity and reliability in the assessments. Positive results were seen in improving knowledge, attitude and refusal self-efficacy, and reducing intention to use tobacco products. Thus, we recommend the modular instruction guideline by Russell (1974) to be followed in developing a health promotion module.

A quasi-experimental study design was chosen in determining effectiveness of TUPY-S to allow selection of participants to focus on high risk population. However, a randomised control trial would be the best design in assessing effectiveness of an intervention. However, it was not feasible in this study due to a small study area which would lead to possibility of the schools chosen for the control group located near to the intervention group leading to contamination of information among the former. On the other hand, we advocate the use of a randomised control trial in future studies.

On top of that, previous studies with statistically significant results produced interventions which were delivered in multiple sessions. Learning and retaining new knowledge are enhanced by repetitive input, especially when delivered in multiple

methods. Undoubtedly, the outcomes of the study would improve statistically following multiple exposure to the content. Hence, repetitive delivery of interventions is highly recommended in future studies.

ii. Population and sampling

Most of the previous studies especially those with statistically significant results involved a larger number of study participants which was not feasible in this study since the number of pupils in the selected schools was limited. However, the number of participants in our study was adequate according to the calculated sample size at a sufficient power of study. On the contrary, in order to increase the chance of getting statistically significant results, a larger study area is suggested in future study to allow availability of larger sample frame. Moreover, study results would be able to be inferred to a wider scope of population.

iii. Outcomes of the study

In this study, only the immediate and intermediate effects were assessed. According to Russell et al. (1974), in the final step of a modular instruction development, Phase-3 of this study is considered a field test among a portion of the target group. Hence, Phase-3 was planned to assess the short-term effects and subsequently to allow improvement to be made before being implemented among the target population. On the other hand, long-term effects is proposed to be assessed in the future studies with multiple repeated assessments to observe the effect of the intervention over time.

iv. Future recommendations

Finally, due to the favourable outcomes, TUPY-S is recommended to be included in the current curriculum as an adjunct material in teaching or replacing the relevant session on the tobacco use. Furthermore, the implementation of TUPY-S is effortless due to self-directed interactive nature of its delivery, minimal duration of time, low cost and no need for facilitator training.

7.7 Conclusion

Preventing tobacco use among the youth continues to be a major effort in health care worldwide. The extensive use of information technology is a social norm of the current era. This study attempted to produce an information technology driven tobacco use prevention strategy. The effect of a self-directed interactive digital media approach was demonstrated and confirmed its feasibility for youth health promotion and health education. TUPY-S has good content validity among the experts, and satisfactory face validity and reliability among the target population. It is able to improve knowledge, attitude and refusal self-efficacy, along with reducing intention to use tobacco products among the early adolescents. The strength of this study is the comprehensive steps followed in its development as outlined by Russell (1974) and is highly recommended in developing a modular instruction in the future. TUPY-S is ready to be implemented to prevent tobacco product use among the early adolescents at substantial risk of using tobacco products living in Malaysia.

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APPENDICES

Appendix 1 Borang Maklumat Kajian, Parental Ascent and Consent forms

PUSAT PENGAJIAN PSIKOLOGI GUNAAN, DASAR DAN KERJA SOSIAL
COLLEGE OF ART AND SCIENCES

BORANG MAKLUMAT KAJIAN DAN KEIZINAN
(PROJEK PENYELIDIKAN)

MAKLUMAT KAJIAN

Tajuk Kajian: Tobacco Use Prevention for the Young Module (TUPY-M): sebuah modul pencegahan penggunaan produk tembakau melalui multimedia interaktif dari perspektif remaja di Kota Bharu, Kelantan

Nama Penyelidik: **Dr Faridah binti Mohd Zin**
Nama Penyelia: **Professor Madya Dr Jamaludin bin Mustafa**
Dr Azlin Hilma binti Hillaluddin

Pusat tanggungjawab:
Pusat Pengajian Psikologi Gunaan, Dasar dan Kerja Sosial
UUM College of Arts and Sciences,
06010 UUM Sintok,
Kedah Darul Aman.

PENGENALAN

Anak anda dipelawa untuk menyertai Fasa 3 satu kajian penyelidikan secara sukarela untuk menguji keberkesanan modul pencegahan penggunaan produk tembakau (TUPY-M). Modul ini merupakan sebuah modul multimedia interaktif yang menggunakan komputer.

Ia dibina untuk mencegah penggunaan semua jenis produk tembakau yang mengandungi nikotin dikalangan pelajar sekolah rendah.

Secara keseluruhan, kajian ini mempunyai tiga fasa;

Fasa 1: Persepsi pelajar tingkatan 4 mengenai kandungan modul
Fasa 2: Pembinaan, pengesahan dan kebolehpercayaan modul TUPY-M dan soal-selidik TUPY-Q
Fasa 3: Kajian keberkesanan TUPY-M

Tuan/puan diminta untuk menerangkan kepada anak anda mengenai kajian ini. Jika anak anda ingin mengambil bahagian dalam kajian ini, ibu bapa / penjaga juga perlu bersetuju.

Anak anda tidak perlu mengambil bahagian dalam kajian ini jika tidak mahu, walaupun ibu bapa anda telah bersetuju.
Penyertaan anak anda di dalam kajian ini dijangka mengambil masa selama **30 minit** sebanyak **4 sesi** dalam masa **3 bulan** . Enam(6) buah sekolah rendah akan terlibat dalam kajian ini yang melibatkan seramai 240 pelajar darjah lima (5).

TUJUAN KAJIAN

Kajian ini bertujuan adalah untuk menguji keberkesanan sebuah modul multimedia interaktif berkomputer untuk mencegah remaja dari mula merokok.

KELAYAKAN PENYERTAAN

Beberapa keperluan untuk menyertai kajian ini adalah;

- Anak anda adalah pelajar darjah 5 di sekolah rendah kerajaan
- Anak anda boleh memahami dan bertutur di dalam Bahasa Melayu
- Anak anda bersetuju untuk menyertai kajian ini

Anak anda tidak boleh menyertai kajian ini sekiranya;

- Anak anda adalah pelajar kelas khas

PROSEDUR KAJIAN

1. Enam (6) buah sekolah akan terlibat di dalam fasa ini. Tiga (3) buah akan menjadi kumpulan intervensi manakala tiga (3) buah sekolah lagi akan menjadi kumpulan kawalan.
2. Anak anda yang mengembalikan borang keizinan yang lengkap akan dipilih secara rawak untuk menjadi peserta kajian.
3. Aktiviti;

Sesi	Aktiviti	Tempoh
1 (minggu 0)	1. Menjawap soalan kajiselidik TUPY-Q	30 minit
2 (minggu 1)	1. Menjawap soalan kajiselidik TUPY-Q	30 minit
3 (minggu 8)	1. Menjawap soalan kajiselidik TUPY-Q 2. Melalui modul pencegahan merokok TUPY-M	30 minit 30 minit

4. **Nama atau nombor identiti anak anda akan ditulis di borang kaji selidik ini akan dirahsiakan.**

PENYERTAAN DALAM KAJIAN

Penyertaan pelajar dalam kajian ini adalah secara sukarela.

MANFAAT YANG MUNGKIN [Manfaat terhadap Individu, Masyarakat, Universiti]

TUPY-M ini akan diberikan kepada sekolah anda tanpa kos. Hasil atau maklumat kajian ini diharapkan, dapat memberi manfaat kepada para remaja pada masa hadapan. Kami bercadang untuk menerapkan modul ini ke dalam kurikulum sekolah sekiranya ia menunjukkan kesan positif.

PERSOALAN

Sekiranya anda mempunyai sebarang soalan mengenai prosedur kajian ini atau hak-hak anda, sila hubungi;

Dr Faridah Mohd Zin (NIC: 740516086364)
Jabatan Perubatan Keluarga
Kampus Kesihatan, USM
16150 Kubang Kerian,
Kelantan.
Tel: 019-5183434 (h/p), 09-7676612(pej)
Email : faridahz@usm.my

KERAHSIAAN

Maklumat anak anda akan dirahsiakan. Ianya tidak akan dedahkan secara umum melainkan jika ia dikehendaki oleh undang-undang.

Data yang diperolehi dari kajian yang tidak mengenalpasti anak anda secara perseorangan atau sekolah secara spesifik dan mungkin akan diterbitkan untuk tujuan memberi pengetahuan baru. Maklumat anak anda akan disimpan dalam komputer dan diproses dengan menggunakan nombor pengenalan. Borang soal selidik pelajar yang asal mungkin akan dilihat oleh pihak penyelidik, pusat pengajian dan pihak berkuasa regulatori untuk tujuan mengesahkan prosedur dan/atau data kajian klinikal.

Dengan menandatangani borang persetujuan ini, pihak tuan membenarkan penelitian rekod, penyimpanan maklumat dan pemindahan data seperti yang dihuraikan di atas.

Borang Keizinan Ibu Bapa / Penjaga
(Halaman Tandatangan)

Tajuk Kajian: **Tobacco Use Prevention for the Young (TUPY-M): sebuah modul pencegahan penggunaan produk tembakau melalui multimedia interaktif dari perspektif remaja di Kota Bharu, Kelantan**

Nama Penyelidik: Dr Faridah binti Mohd Zin

Untuk anak anda menyertai kajian ini, anda mesti menandatangani mukasurat ini.
Dengan menandatangani mukasurat ini, saya mengesahkan yang berikut:

- Saya telah membaca semua maklumat dalam Borang Maklumat dan Keizinan ini dan saya telah pun diberi masa yang mencukupi untuk mempertimbangkan maklumat tersebut.
- Semua soalan-soalan saya telah dijawab dengan memuaskan.
- Saya, secara sukarela, bersetuju memberi kebenaran bagi anak saya menyertai kajian penyelidikan ini, mematuhi segala prosedur kajian dan memberi maklumat yang diperlukan jika diminta.
- Saya boleh meminta anak saya menamatkan penyertaannya dalam kajian ini pada bila-bila masa.
- Saya telah pun menerima satu salinan Borang Maklumat dan Keizinan untuk simpanan peribadi saya.

_____	_____
Nama Ibu/Bapa / Penjaga*	**Nama Anak**
_____	_____
No. Kad Pengenalan Ibu/Bapa / Penjaga	**No. Sijil Lahir Pelajar**
_____	_____
Tandatangan Ibu/Bapa/ Penjaga	**Tarikh**
_____	_____
Nama Saksi[ii] dan Tandatangan	**Tarikh**

Nota: i) Semua yang mengambil bahagian dalam projek penyelidikan ini tidak dilindungi insuran.

ii) Saksi adalah ibu/bapa/penjaga/guru yang bukan seperti nama yang tertera di* atau mana-mana orang dewasa

Borang Keizinan Ibu Bapa / Penjaga
(Halaman Tandatangan)

Tajuk Kajian: **Tobacco Use Prevention for the Young (TUPY-M): sebuah modul pencegahan penggunaan produk tembakau melalui multimedia interaktif dari perspektif remaja di Kota Bharu, Kelantan**

Nama Penyelidik: **Dr Faridah binti Mohd Zin**

Untuk anda menyertai kajian ini, anda mesti menandatangani mukasurat ini.

Saya faham bahawa kajian ini adalah untuk menguji modul pencegahan merokok dan saya mungkin akan berada di dalam kumpulan intervensi atau kumpulan kawalan. Saya faham bahawa kumpulan intervensi akan mendapat modul pencegahan merokok dalam tempoh kajian manakala kumpulan kawalan akan mendapatkan modul pencegahan merokok selepas tempoh kajian. Saya faham bahawa saya perlu untuk menjawab soal selidik untuk 3 kali seperti yang dinyatakan sebelum ini. Saya faham bahawa maklumat saya tidak akan dikongsi dengan orang lain. Walau bagaimanapun hasil kajian akan dinyatakan kepada saya, ibu bapa saya , guru saya dan akan dikongsi dalam mana-mana jurnal atau sesiapa sahaja yang berminat dalam kajian ini.

Saya telah membaca maklumat ini , semua persoalan saya telah terjawab dan saya tahu bahawa saya boleh bertanya kemudian jika saya mempunyai sebarang persoalan.

Saya bersetuju untuk mengambil bahagian dalam kajian ini.

_____ _____

Nama Pelajar **Tarikh**

_____

No. Sijil Lahir Pelajar

_____ _____

Nama & Tandatangan ibu/bapa/penjaga yang mengendalikan Perbincangan Keizinan **Tarikh**

_____ _____

Nama Saksi dan Tandatangan **Tarikh**

Nota: i) Semua yang mengambil bahagian dalam projek penyelidikan ini tidak dilindungi insuran.
ii) Saksi adalah ibu/bapa/penjaga/guru yang bukan seperti nama yang tertera di* atau mana-mana orang dewasa

Appendix 2: Semi-structured questionnaire for need assessment

No.	Item
1.	*The need for the program:* "Adakah anda bersetuju untuk membina program pencegahan penggunaan produk tembakau yang baru?"
2.	*Reasons for the program importance*: "Mengapa anda bersetuju untuk membina program pencegahan penggunaan produk tembakau yang baru?"
3.	*The scope and component of the program* "Apakah kandungan yang perlu ada di dalam sebuah program pencegahan penggunaan produk tembakau?"
4.	*Target audiences:* "Pada umur berapakah program pencegahan penggunaan produk tembakau paling sesuai dilaksanakan?"
5.	*Mode of program implementation:* "Bagaimanakah cara perlaksanaan yang berkesan?"
6.	*The role of religion:* "Adakah anda rasa agama mempunyai peranan di dalam kandungan sebuah program pencegahan penggunaan produk tembakau?"
7.	*Reasons for the use of religion in the smoking prevention program:* "Kenapa anda bersetuju mengenai peranan agama?"
8.	*The possible barriers of program implementation:* "Apakah halangan-halangan yang dijangkakan ketika melaksanakan program?"
9.	*Strategies to increase program effectiveness:* "Apakah yang boleh dilakukan untuk meningkatkan keberkesanan program pencegahan penggunaan produk tembakau?"

Appendix 3: TUPY-Q (Tobacco Use Prevention Strategy for the Young – Questionnaire)

TUPY-Q

ID	Minggu 0	Minggu 1	Minggu 8

SOAL SELIDIK MENGENAI PENGETAHUAN, SIKAP, KEINGINAN, KEMAHIRAN PENOLAKAN DAN EFIKASI KENDIRI TERHADAP PENCEGAHAN PENGGUNAAN PRODUK TEMBAKAU DALAM KALANGAN AWAL REMAJA

Penyelidik: **Dr. Faridah Mohd Zin**
Prof. Madya Dr Jamaludin Mustaffa
Dr. Azlin Hilma Hillaluddin
Pusat kajian: **Pusat Pengajian Psikologi Gunaan, Dasar dan Kerja Sosial**
College of Art and Sciences
Universiti Utara Malaysia

Arahan:

- Borang soal selidik ini mempunyai **7 mukasurat**
- Borang soal selidik ini mengandungi **6 BAHAGIAN** iaitu A, B, C, D, E dan F.
  - **Bahagian A: -** mengandungi **12 soalan** mengenai latar belakang anda
  - **Bahagian B: -** mengandungi **12 soalan** mengenai pengetahuan anda mengenai produk tembakau
  - **Bahagian C: -** mengandungi **12 soalan** mengenai sikap anda terhadap merokok
  - **Bahagian D: -** mengandungi **5 soalan** mengenai keinginan anda untuk merokok
  - **Bahagian E: -** mengandungi **8 soalan** mengenai kemahiran penolakan terhadap ajakan merokok
  - **Bahagian F: -** mengandungi **12 soalan** mengenai kekuatan efikasi kendiri anda terhadap merokok
- Sila baca arahan dengan teliti dan jawab semua soalan.
- Anda **TIDAK DIBENARKAN** untuk berbincang dengan peserta lain.
- Anda dibenarkan untuk bertanya penyelidik sekiranya mengalami kesulitan.
- **PRODUK TEMBAKAU/ROKOK BERMAKSUD ROKOK, ROKOK DAUN, KRETEK, CERUT, BIDIS VAPE, E-CIGARETTE DAN SHISHA.**
- **MEROKOK BERMAKSUD MENGGUNAKAN/MENGHISAP PRODUK TEMBAKAU**
- **JAWAPAN ANDA ADALAH RAHSIA**

BAHAGIAN A: LATAR BELAKANG ANDA

Sila **tanda (√)** di kotak yang berkenaan

A01. Nama: _____ A02. Kelas: _____

A03. Sekolah: _____

A04. Tarikh Lahir: _____ A05. Umur: _____

A06. Bangsa:

- ☐ Melayu
- ☐ Cina
- ☐ India
- ☐ Lain-lain: _____ (Sila nyatakan)

A07. Agama:

- ☐ Islam
- ☐ Hindu
- ☐ Budha
- ☐ Kristian
- ☐ Lain-lain: _____ (Sila nyatakan)

A08. Anda tinggal bersama siapa di rumah anda?
(Anda boleh menanda √ lebih daripada 1 kotak)

- ☐ Ayah
- ☐ Ibu
- ☐ Datuk
- ☐ Nenek
- ☐ Adik beradik
- ☐ Lain-lain: _____(Sila nyatakan)

A09. Adakah terdapat ahli keluarga anda di A08 yang merokok?

☐ ya ☐tidak

A10. Wang saku anda setiap hari (RM): _____ (Sila nyatakan)

A11. Adakah anda pernah merokok? ☐ ya ☐ tidak

A12. Jika Ya di A11;

Berapa kerapkah anda merokok?

- ☐ setiap hari
- ☐ seminggu sekali
- ☐ sebulan sekali
- ☐ setahun sekali
- ☐ lebih dari satu kali seumur hidup
- ☐ satu kali seumur hidup

BAHAGIAN B: PENGETAHUAN

Sila **TANDAKAN (√)** di kotak 'betul', 'salah' atau 'tidak tahu'

Kod	Item	Betul	Salah	Tidak tahu
P01	Ketagihan adalah disebabkan oleh nikotin.			
P02	Menurut agama Budha, benda yang memudaratkan tubuh atau fikiran perlu dielakkan termasuk merokok.			
P03	Penjualan produk tembakau kepada mereka yang di bawah umur 18 tahun adalah satu kesalahan di Malaysia.			
P04	Merokok di kompleks membeli-belah ialah satu kesalahan di Malaysia.			
P05	Jika mereka yang berumur di bawah 18 tahun merokok, denda sebanyak RM1000 boleh dikenakan.			
P06	Dibuang sekolah adalah salah satu tindakan disiplin yang boleh dikenakan ke atas pelajar yang merokok dalam kawasan sekolah.			
P07	Ibubapa akan dimaklumkan sekiranya pelajar ditangkap merokok dalam kawasan sekolah.			
P08	Mudah beradaptasi dengan persekitaran yang baru melambangkan kekuatan diri			
P09	Merokok melambangkan fikiran negatif.			
P10	Stres boleh dikurangkan dengan bersenam.			
P11	Berjalan kaki adalah sejenis senaman yang berfaedah.			
P12	Anak bertanggungjawap menjaga maruah ibu.			

BAHAGIAN C: SIKAP

Sila **TANDAKAN (√)** di kotak yang sesuai berdasarkan skala berikut;

1 (sangat tidak setuju)	**2** (tidak setuju)	**3** (tidak pasti)	**4** (setuju)	**5** (sangat setuju)

Kod	**Item**	**1** (sts)	**2** (ts)	**3** (tp)	**4** (s)	**5** (ss)
S01	Ramai orang akan berkawan dengan saya sekiranya saya menghisap rokok.					
S02	Saya percaya seseorang akan nampak dewasa sekiranya merokok.					
S03	Saya percaya merokok boleh mengukuhkan persahabatan.					
S04	Saya tidak mampu menolak jika disuruh merokok oleh senior.					
S05	Merokok melambangkan gaya terkini.					
S06	Pelajar sekolah menengah sudah cukup dewasa untuk merokok.					
S07	Menaikkan harga rokok adalah strategi yang berkesan untuk menghalang remaja daripada merokok.					
S08	Saya percaya iman yang kuat dapat menghalang remaja daripada merokok.					
S09	Bagi saya, merokok melambangkan keberanian.					
S10	Saya rasa saya akan lebih gembira apabila bermain bola bersama rakan-rakan daripada merokok bersama mereka.					
S11	Rokok itu selamat sekiranya bapa juga merokok.					
S12	Saya sanggup menolak pelawaan merokok untuk menjaga maruah keluarga.					

BAHAGIAN D: KEINGINAN UNTUK MEROKOK

Apakah keinginan anda untuk merokok?
Sila **TANDAKAN (√)** di kotak yang sesuai;

1 (sangat tidak mungkin)	**2** (tidak mungkin)	**3** (tidak pasti)	**4** (mungkin)	**5** (sangat mungkin)

Bil.	**Item**	**1 (stm)**	**2 (tm)**	**3 (tp)**	**4 (m)**	**5 (sm)**
I01	Saya berkeinginan untuk merokok sepanjang satu minggu ini.					
I02	Saya berkeinginan untuk merokok sepanjang satu bulan ini.					
I03	Saya berkeinginan untuk merokok semasa berada di tingkatan 1, 2 dan 3.					
I04	Saya berkeinginan untuk merokok semasa berada di tingkatan 4 dan 5.					
I05	Saya berkeinginan untuk merokok selepas tamat tingkatan 5.					

BAHAGIAN E: KAEDAH PENOLAKAN AJAKAN

Apabila anda dipelawa/diajak merokok, apakah kemungkinan anda mengunakan cara di bawah untuk menolak pelawaan/ajakan itu?

Sila **TANDAKAN (√)** di kotak yang sesuai

1 (sangat tidak mungkin)	**2** (tidak mungkin)	**3** (tidak pasti)	**4** (mungkin)	**5** (sangat mungkin)

Bil.	**Item**	**1 (stm)**	**2 (tm)**	**3 (tp)**	**4 (m)**	**5 (sm)**
T01	Saya menolak dengan keras. Contoh: *'Tidak, saya tidak mahu, saya tidak ingin cuba'*					
T02	Saya menasihati mereka mengenai akibat merokok. Contoh: *'Merokok adalah salah di sisi undang-undang'*					
T03	Saya menggunakan alasan tersendiri. Contoh: *'Saya memang penakut, saya tak nak merokok'*					
T04	Saya menggunakan masalah kesihatan sebagai alasan. Contoh: *'Saya ada asma, jadi saya tak mahu merokok'*					
T05	Saya menukar tajuk perbualan. Contoh: *'Saya dengar ada game baru la, jom'*					
T06	Saya menggunakan perbahasan untuk menolak pelawaan. Contoh: *'Jika saya merokok kerana awak merokok, maka saya tiada pendirianlah!'.*					
T07	Saya menasihati mereka mengenai keburukan merokok terhadap kesihatan. Contoh: *'Kitakan kawan, saya risau merokok akan merosakkan kesihatan awak'*					
T08	Saya mencadangkan aktiviti lain yang lebih berfaedah seperti bersukan. Contoh: *'Jom kita pergi main bola!'*					

BAHAGIAN F: EFIKASI KENDIRI

Sila **TANDAKAN (√)** di kotak yang sesuai;

1 (sangat tidak yakin)	**2** (tidak yakin)	**3** (tidak pasti)	**4** (yakin)	**5** (sangat yakin)

Bil.	**Item**	**1 (sty)**	**2 (ty)**	**3 (tp)**	**4 (y)**	**5 (sy)**
K01	Saya tidak akan merokok walaupun rakan-rakan merokok.					
K02	Saya tidak akan merokok walaupun merasa marah.					
K03	Saya tidak akan merokok walaupun merasa tertekan.					
K04	Saya tidak akan merokok walaupun merasa bosan.					
K05	Saya tidak akan merokok walaupun dihulur rokok oleh kawan-kawan.					
K06	Saya tidak akan merokok walaupun diejek oleh kawan-kawan.					
K07	Saya tidak akan merokok walaupun diberi rokok oleh ahli keluarga.					
K08	Saya tidak akan merokok walaupun melihat idola merokok.					
K09	Saya akan menasihati rakan yang merokok.					
K10	Saya akan menasihati ahli keluarga yang merokok.					
K11	Saya akan melaporkan kepada ibubapa tentang kedai yang menjual rokok kepada pelajar sekolah.					
K12	Saya tidak akan membelikan rokok apabila disuruh oleh bapa.					

SEKIAN, TERIMA KASIH

Appendix 4: Background details of the expert reviewers

A. Expert reviewers for TUPY-S

No.	Name and affiliation
1.	Dr. Mohd Zarawi bin Mat Nor (K.B,P.A) B.A (Hons) (UM), M.Ed (G&C) UKM, PhD Counselling (UM) Currently, he is a lecturer at Department of Medical Education, USM. Previously, he was a lecturer at Institut Pendidikan Guru Kampus, Kota Bharu, Kelantan, and a counselor at SM.Teknik Bachok, SM.Teknik Pengkalan Chepa and SM.Vokasional Kuching, Sarawak.
2.	Dr. Noor Aman bin A Hamid MB BCh BAO, DME, MPH, PhD (UCD, Ireland) His specialities include Social Epidemiology, Medical sociology (Health and Social inequalities), Quantitative and qualitative research methods, Health of the Elderly, Maternal and Child health and Minority/indigenuous health.
3.	Associate Professor Dr. Azizah binti Othman Doctor of Psychology (Clinical) Her specialities include psychological assessment, psychotherapy and counselling, especially in Cognitive Behaviour Therapy (CBT). Her specific working & research interest are in children and their family with behavioural and emotional problems.
4.	Dr. Rohani binti Ismail B.Sc. Human Development (UPM), M.Med.Sc (UKM) Community Health, PhD (UKM) Community Health (Health Education) She specialized in health education and promotion, public health and smoking behavior.
5.	Md Zawawi bin Abu Bakar Doctor of Philosophy Senior Lecturer, Department of Social Work, Aplied Sciences and Policy His specialities include islamic family law, social work and religion, and islamic studies.
6.	En. Nareeman Shah bin Che Muhamad Ketua Pejabat Timbalan Pengarah Pegawai Teknologi Maklumat, Pusat Pengetahuan Komunikasi dan Teknologi His field of work is focused primarily on digitally producing teaching materials for eLearn@USM Portal.

B. Expert reviewers for TUPY-Q

No.	Name and affiliation
1.	Associate Professor Dr Norhayati binti Mohd Noor MD, MPH, PhD. Currently, she is a senior lecturer at Department of Family Medicine, USM. Her specialities include Quantitative and Qualitative Research Methods, and Maternal Health.
2.	Dr. Noor Aman bin A Hamid MBBChBAO, DME, MPH, PhD (UCD, Ireland) His specialities include Social Epidemiology, Medical Sociology (Health and Social Inequalities), Quantitative and Qualitative Research Methods, Health of the Elderly, Maternal and Child Health and Minority/Indigenuous Health.
3.	Dr Azlin Hilma binti Hillaluddin BA (Psych), MSW (Children, Youth and Families), PhD (Social Work) Department of Psychology, Social Work and Policy College of Art and Sciences UUM, Sintok, Kedah. She is a senior lecturer at the Department of Psychology, Social Work and Policy with main interest in child development and social work.
4.	En. Muhd Kamal bin Ismail Guru Penolong Bahasa Melayu Sekolah Kebangsaan Kubang Kerian 3 Jalan Raja Perempuan Zainab II 16150, Kota Bharu Kelantan, Malaysia. He is currently a teacher at SK Kubang Kerian III. He is also a recognised examiner for UPSR in Bahasa Melayu.
5.	Pn. Mazrah binti Mohd Hassan Guru Penolong Bahasa Melayu Sekolah Kebangsaan Kubang Kerian 3 Jalan Raja Perempuan Zainab II 16150, Kota Bharu Kelantan, Malaysia. She is currently a teacher at SK Kubang Kerian III. She is also a recognised examiner for UPSR in Bahasa Melayu.

Appendix 5: Evaluation form for content validity of TUPY-S by experts

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SOAL SELIDIK KESAHAN KANDUNGAN MODUL TUPY-S:
modul multimedia interaktif untuk pencegahan penggunaan produk tembakau di kalangan awal remaja

Arahan

Berikut adalah beberapa pernyataan berkaitan dengan modul TUPY-S.
Sila bulatkan jawapan berdasarkan skala berikut:

1	2	3	4	5
Sangat Tidak Setuju	Tidak Setuju	Tidak Pasti	Setuju	Sangat Setuju

Bil.	**Pernyataan**	**Pilihan**
1.	Kandungan modul ini menepati sasaran populasinya	1 2 3 4 5
2.	Kandungan modul ini boleh dilaksanakan dengan sempurna	1 2 3 4 5
3.	Kandungan modul ini bersesuaian dengan masa yang diperuntukan	1 2 3 4 5
4.	Kandungan modul ini boleh mencegah penggunaan produk tembakau dikalangan awal remaja	1 2 3 4 5
5.	Kandungan modul ini boleh mengubah sikap terhadap penggunaan produk tembakau dikalangan awal remaja	1 2 3 4 5

Pandangan dan Komen

_____

_____

_____

_____

_____

_____

Nama: **Tarikh:**

Appendix 6: Evaluation form for face validity and reliability assessment of TUPY-S

SOAL SELIDIK PENILAIAN KANDUNGAN MODUL TUPY-S:
modul multimedia interaktif untuk pencegahan penggunaan produk tembakau di kalangan awal remaja

Bahagian A: Maklumat Diri

A01: Nama: _____

A02: Sekolah: _____

A03: Kelas: _____

Bahagian B: Soal Selidik Kebolehpercayaan Modul

Arahan

1. Ujian ini mengandungi pernyataan bagi mengukur tahap pemahaman aktiviti TUPY-S
2. Tidak ada jawapan yang betul atau salah
3. Anda diminta menjawab dengan ikhlas dan jujur
4. Sila **BULATKAN NOMBOR** berdasarkan skala berikut;

1	2	3	4	5
Sangat Tidak Setuju	Tidak Setuju	Tidak Pasti	Setuju	Sangat Setuju

Submodul 1: Produk Tembakau

Bil	Pernyataan	Respon				
1	Saya dapat memahami jenis-jenis produk tembakau dengan baik	1	2	3	4	5
2	Saya dapat memahami kandungan produk tembakau dengan baik	1	2	3	4	5
3	Saya dapat memahami kesan nikotin dengan baik	1	2	3	4	5
4	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 2: Produk tembakau dan kesihatan

Bil	Pernyataan	Respon				
1	Saya dapat memahami kesan produk tembakau terhadap kesihatan dengan baik	1	2	3	4	5
2	Saya dapat memahami mengenai perokok aktif, sekunder dan tertier dengan baik	1	2	3	4	5
3	Saya dapat memahami kebaikan jika tidak merokok dengan baik	1	2	3	4	5
4	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 3: Produk tembakau dan rakan

Bil	Pernyataan	Respon				
1	Saya dapat memahami cara menolak ajakan merokok dengan baik	1	2	3	4	5
2	Saya dapat memahami kesan merokok terhadap diri dengan baik	1	2	3	4	5
3	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 4: Produk tembakau dan agama

Bil	Pernyataan	Respon				
1	Saya dapat memahami pendapat agama Islam terhadap merokok dengan baik	1	2	3	4	5
2	Saya dapat memahami pendapat agama Budha terhadap merokok dengan baik	1	2	3	4	5
3	Saya dapat memahami pendapat agama Hindu terhadap merokok dengan baik	1	2	3	4	5
4	Saya dapat memahami pendapat agama Kristian terhadap merokok dengan baik	1	2	3	4	5

Submodul 5: Produk tembakau dan undang-undang

Bil	Pernyataan	Respon				
1	Saya memperolehi pengetahuan tentang undang-undang sekolah mengenai rokok dengan baik	1	2	3	4	5
2	Saya memperolehi pengetahuan tentang undang-undang Malaysia mengenai rokok dengan baik	1	2	3	4	5
3	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 6: Efikasi kendiri

Bil	Pernyataan	Respon				
1	Saya dapat memahami bagaimana untuk membuat keputusan yang bijak	1	2	3	4	5
2	Saya dapat memahami bagaimana untuk membuat keputusan yang tegas	1	2	3	4	5
3	Saya dapat memahami kepentingan untuk membuat keputusan yang tegas	1	2	3	4	5
4	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 7: Gaya hidup sihat

Bil	Pernyataan	Respon				
1	Saya dapat memahami kepentingan harga diri dengan baik	1	2	3	4	5
2	Saya dapat memahami cara menangani stress dengan baik	1	2	3	4	5
3	Saya dapat memahami kepentingan bersenam dengan baik	1	2	3	4	5
4	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Submodul 8: Saya dan keluarga saya

Bil	Pernyataan	Respon				
1	Saya dapat mengenali remaja dengan baik	1	2	3	4	5
2	Saya dapat memahami kasih sayang ibubapa dengan baik	1	2	3	4	5
3	Saya dapat memahami fungsi ahli keluarga dengan baik	1	2	3	4	5
4	Saya dapat melaksanakan modul dengan baik	1	2	3	4	5

Appendix 7: The sample size calculation for the quasi-experimental study

Variable	α	P	σ	Ref.	δ	m	SS Per group	SS+20% Per group
Knowledge	0.05	0.8	2.86	Tahlil,2013	2	1	32	39
Attitude			10.1	Tahlil,2013	4		101	120
Intention to use			15.4	Tahlil,2013	7		77	93
Refusal skill			0.88	Nichols,2010	0.5		50	60
Self-efficacy			0.84	Nichols,2010	0.5		45	55

Appendix 8: TUPY-S module (Tobacco Use Prevention for the Young- Strategy)

TUPY-S:
modul multimedia interaktif untuk pencegahan penggunaan produk tembakau di kalangan awal remaja

Pengenalan

Merokok terus menjadi antara masalah sosial yang utama dalam kalangan remaja di serata dunia. Modul ini adalah sebuah modul pencegahan penggunaan produk tembakau untuk remaja yang dilihat dari sudut pandangan mereka sendiri dan disampaikan melalui multimedia interaktif. Kandungan modul telah dibina dengan kaedah triangulasi di antara perspektif remaja, faktor-faktor ramalan teori yang berkaitan dengan penggunaan tembakau dalam kalangan remaja, dan adaptasi modul-modul yang relevan dari kajian literature terutamanya Health Belief Model (Rosenstock, 1990). Modul ini diharapkan berkesan untuk meningkatkan pengetahuan, sikap, skil penolakan, efikasi kendiri dan mengurangkan keinginan merokok dikalangan remaja. Modul ini juga diharapkan untuk diterapkan ke dalam kurikulum sekolah bagi memastikan kebolehsampaian dan kelestarian yang jitu.

Kumpulan sasaran: Pelajar sekolah rendah 10 hingga 12 tahun

Masa: 45 minit

Peralatan: Komputer

Kandungan:

Sub-modul 1: Produk Tembakau

Pengenalan

Pengetahuan mengenai jenis-jenis produk tembakau beserta kandungannya dan tindakbalas terhadap tubuh manusia adalah komponen yang penting di dalam langkah pencegahan penggunaan produk tembakau. Terdapat banyak jenis produk tembakau di pasaran dan nikotin merupakan kandungan utamanya yang membawa kepada ketagihan.

Tajuk	**"Produk Tembakau"**
Objektif	Untuk meningkatkan pengetahuan mengenai jenis, kandungan dan kesan produk tembakau terhadap tubuh perokok aktif dan pasif.
Peralatan	Komputer
Komponen	Unit 1 – Kenali Produk Tembakau Unit 2 – Produk Tembakau dan Tubuh Manusia Unit 3 – Aktiviti Pengukuhan
Unit 1 – Kenali Produk Tembakau	
Objektif	Untuk meningkatkan pengetahuan mengenai jenis produk tembakau dan kandungannya
Aktiviti	Tajuk: ***"Kenali produk tembakau"*** Arahan: Klik dan tonton. Klik pada gambar produk tembakau Nota: 1. Jenis produk tembakau adalah seperti berikut; a. Jenis berasap: rokok, rokok daun, keretek, shisha, bidis, e-cigarette, vape b. Jenis tidak berasap: kunyah, sedut, tembakau larut 2. Kandungan produk tembakau a. Rokok dan rokok daun: nikotin dan lebih 7000 bahan kimia termasuk tar, acetone, ammonia dan karbon monoksida b. Keretek: nikotin dan lebih 7000 bahan kimia yang sama seperti rokok dan terdapat perisa seperti bunga cengkih c. E-cigarette: nikotin dan bahan kimia
Unit 2 – Produk Tembakau dan Tubuh Manusia	
Objektif	Untuk mengetahui mengenai nikotin dan tindakbalas tubuh manusia terhadapnya

Aktiviti 1	Tajuk: ***"Apa itu nikotin?"*** Arahan: Klik dan tonton Nota: Tindakbalas tubuh terhadap nikotin 1. Apabila nikotin dihisap; - nikotin diserap ke dalam otak dalam masa 10-16 saat selepas dihisap - nikotin disebarkan ke seluruh tubuh dalam masa 15-20 minit 2. Apabila nikotin digunakan tanpa dihisap; - nikotin disebarkan ke seluruh tubuh dalam masa 15-20 minit 3. Nikotin menyebabkan rembesan bahan-bahan kimia tubuh termasuk; a. Dopamin: - menyebabkan rasa seronok dan kurang selera makan b. Noradrenalin: - meningkatkan kesedaran dan kurang selera makan c. Vasopresin: - meningkatkan daya ingatan d. Serotonin: - mengawal emosi dan kurang selera makan e. Beta-endorfin: - mengurangkan ketegangan dan kerisauan
Unit 3 – Aktiviti Pengukuhan	
Objektif	Untuk meperkukuh pengetahuan mengenai jenis, kandungan dan kesan produk tembakau terhadap tubuh.
Aktiviti	Tajuk: ***"Produk Tembakau"*** Arahan: Klik dan tonton Nota: Menonton video lakonan yang mengandungi rumnusan tentang produk tembakau dan kesan nikotin terhadap tubuh manusia.

Sub-modul 2: Tembakau dan Kesihatan

Pengenalan

Produk tembakau memberi kesan yang negative terhadap kesihatan terhadap perokok aktif dan pasif.

Tajuk	**"Produk Tembakau dan Kesihatan"**
Objektif	Untuk meningkatkan pengetahuan mengenai kesan penggunaan tembakau ke atas kesihatan pengguna aktif dan pasif
Komponen	Unit 1 - Penggunaan produk tembakau dan kesannya ke atas kesihatan Unit 2 – Kesan terhadap kesihatan ke atas perokok aktif dan pasif Unit 3 – Kebaikan jika tidak merokok Unit 4 - Aktiviti Pengukuhan
Unit 1: Penggunaan produk tembakau dan kesan ke atas kesihatan	
Objektif	Untuk meningkatkan pengetahuan mengenai penggunaan produk tembakau dan kesannya ke atas kesihatan
Aktiviti	Tajuk: ***"Jahatnya Tembakau"*** Arahan: Klik pada gambar tubuh perokok Nota: Kesan penggunaan produk tembakau terhadap kesihatan termasuk; - keguguran rambut - katarak - pereputan gigi - kulit beredut - jari kekuningan - psoriasis - osteoporosis - sakit jantung - ulser perut - penyakit Buerger - keguguran - mati pucuk - penyakit paru-paru kronik seperti COPD dan emfisima - kanser kulit, hidung, pancreas, uterus, ginjal, paru-paru dan lidah

Unit 2	**Kesan terhadap kesihatan ke atas perokok aktif dan pasif**
Aktiviti	Tajuk: ***"Perokok aktif dan pasif"*** Arahan: Klik pada gambar Nota: Kesan merokok terhadap perokok pasif; 1. Kesan negatif terhadap kesihatan orang dewasa; - strok - ketidakselesaan hidung - kanser paru-paru - penyakit jantung koronari 2. Kesan negatif terhadap kesihatan bayi dan kanak-kanak; - rendah berat lahir - kematian tiba-tiba dikalangan bayi (*Sudden Infant Death Syndrome*) - penyakit telinga tengah - fungsi paru-paru terjejas - penyakit paru-paru seperti asthma (Ruj: Cancer Research United Kingdom. Boleh didapati di http://www.cancerresearchuk.org/)
Unit 3 – Kebaikan jika tidak merokok	
Objective	Untuk meningkatkan pengetahuan mengenai kesan berhenti penggunaan produk tembakau ke atas kesihatan
Aktiviti	Tajuk: ***"Alangkah bagusnya jika tidak merokok"*** Arahan: Klik dan Tonton Nota: Kebaikan jika tidak merokok termasuk; - Panjang umur - Mengelakkan dari bahan merbahaya - Mencegah penyakit - Kehidupan yang sihat - Mencegah dari membahayakan orang lain - Menjadi individu contoh yang baik - Menjimatkan wang

Unit 4 – Aktiviti pengukuhan	
Objektif	Untuk memperkukuh pengetahuan mengenai kesan penggunaan produk tembakau terhadap kesihatan
Aktiviti	Tajuk: ***"Jom Kuiz"*** Arahan: Pilih jawapan yang betul

Sub - modul 3: Produk Tembakau dan Rakan

Pengenalan

Pengaruh rakan sebaya telah dikenalpasti sebagai faktor utama yang membawa kepada penggunaan produk tembakau dikalangan remaja. Dapatan dari kajian kualitatif mengenai persepsi remaja terhadap perkara ini menyokong keperluan mempunyai keupayaan mengenali dan menjauhi mereka yang menggunakan produk tembakau. Meningkatkan skil penolakan juga merupakan komponen yang penting untuk mencegah penggunaan produk tembakau dikalangan remaja.

Tajuk	**"Produk Tembakau dan Rakan"**
Objektif	1.Untuk meningkatkan kemahiran mengenali rakan yang menggunakan produk tembakau dan hasutan mereka 2. Untuk mempelajari skil penolakan yang berkesan apabila dihasut untuk menggunakan produk tembakau
Komponen	Unit1 – Teknik penolakan Unit 2 – Kenali rakan yang merokok
Unit 1 – Teknik penolakan	
Aktiviti	Tajuk: ***"Katakan TIDAK"*** Arahan: Klik dan Tonton Nota: 1. Peserta menonton video lakonan yang menunjukkan teknik-teknik penolakan yang boleh digunakan untuk menolak hasutan penggunaan produk tembakau. 2. Teknik penolakan 8-M yang boleh digunakan adalah termasuk; i. Menasihati bahaya menggunakan produk tembakau ii. Menggunakan masalah kesihatan iii. Menukar topik perbualan iv. Menggunakan alasan sendiri v. Menasihati keburukan merokok vi. Mencadangkan aktiviti yang lebih berfaedah vii. Menggunakan teknik membangkang hujah viii. Menolak dengan keras (Ruj: Nichols, Tracy R, Birnel, Sara, Graber, Julia A, Brooks-Gunn, Jeanne, & Botvin, Gilbert J. (2010). Refusal skill

	ability: An examination of adolescent perceptions of effectiveness. *The journal of primary prevention, 31*(3), 127-137)
Unit 2 – Kenali rakan yang merokok	
Objektif	Untuk meningkatkan kemahiran mengenali rakan yang menggunakan produk tembakau
Aktiviti	**Penerangan**
Aktiviti	Tajuk: ***"Usah mulakan wahai kawan-kawan"*** Arahan: Klik dan tonton Nota: 1. Ciri-ciri fizikal pengguna tembakau termasuk; - bibir hitam - muka keruh - berbau asap tembakau 2. Kesan fizikal - mudah letih bila bersukan

Sub-modul 4: Produk Tembakau dan Agama

Pengenalan

Pegangan agama telah terbukti berkait rapat dengan perlakuan divian dimana pegangan yang lemah lebih mendorong kepada perlakuan negatif. Pegangan agama yang kuat boleh menjadi pelindung kepada penggunaan tembakau melalui kekuatan dalaman dan perasaan memiliki ("*belonging*"). Fakta mengenai pendapat agama-agama utama dunia telah diperolehi dari laporan mesyuarat Iniatif Bebas Tembakau, Persatuan Kesihatan Dunia (WHO) yang telah diadakan di Geneva, Switzerland pada tahun 2003.
(Rujukan: WHO. (2003). Meeting on Tobacco and Religion (NCD, Trans.). Geneva, Switzerland: WHO)

Tajuk	***"Produk Tembakau dan Agama"***
Objektif	1. Untuk meningkatkan pengetahuan mengenai pendapat agama Islam tentang penggunaan produk tembakau 2. Untuk meningkatkan pengetahuan mengenai pendapat agama Budhisme tentang penggunaan produk tembakau 3. Untuk meningkatkan pengetahuan mengenai pendapat agama Hindu tentang penggunaan produk tembakau 4. Untuk meningkatkan pengetahuan mengenai pendapat agama Kristian tentang penggunaan produk tembakau
Komponen	Unit 1 – Islam dan penggunaan produk tembakau Unit 2 – Budhisme dan penggunaan produk tembakau Unit 3 – Hinduisme dan penggunaan produk tembakau Unit 4 – Kristian dan penggunaan produk tembakau
Unit 1 – Islam dan penggunaan tembakau	
Objektif	Untuk meningkatkan pengetahuan mengenai pendapat Islam tentang penggunaan tembakau
Aktiviti	Tajuk: ***"Islam dan Penggunaan Tembakau"*** Arahan: Klik dan tonton Nota: -Antara objektif asas Islam adalah untuk melindungi integriti seseorang Muslim. -Oleh itu, kesan merbahaya produk tembakau terhadap

	kesihatan membuatkannya satu amalan yang bercanggah dengan ajaran Islam. -Muslim seharusnya menghormati ajaran Islam dan menyedari tanggungjawab untuk melindungi tubuh yang merupakan kurniaan tuhan. -Maka, Muzakarah Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal Ehwal Ugama Islam Malaysia yang bersidang kali ke-37 di Dewan Syura, Tingkat 11 Pusat Islam Kuala Lumpur pada 23 Mac 1995 telah membincangkan isu Merokok Dari Pandangan Islam dan telah bersetuju memutuskan seperti berikut: "Merokok adalah haram dari pandangan Islam kerana padanya terdapat kemudaratan" Rujukan: Jawatankuasa Fatwa Majlis Kebangsaan Bagi Hal Ehwal Ugama Islam Malaysia. (2011). Hukum rokok dari pandangan islam.
Unit 2 – Budhisme dan penggunaan tembakau	
Objektif	Untuk meningkatkan pengetahuan mengenai pendapat Budhisme tentang penggunaan tembakau
Aktiviti	Tajuk: ***"Budhisme dan Penggunaan Tembakau"*** Arahan: Klik dan tonton Nota: -Budhisme mengajar Kebebasan (*Freedom*) yang membawa maksud cara hidup tanpa pergantungan atau kehidupan dengan fikiran yang jelas. Fikiran yang jelas berpunca dari kebebasan ketagihan. -Budhisme percaya bahawa manusia hidup saling berhubung dan bergantung antara satu sama lain. -Budhisme juga menyatakan bahawa adalah bernasib baik untuk dilahirkan sebagai manusia dan adalah penting untuk menjaga diri dan juga orang lain. -Maka, segala benda yang memudaratkan tubuh atau fikiran perlu dielakkan termasuk penggunaan produk tembakau

Unit 3 – Hinduisme dan penggunaan tembakau	
Aktiviti	Tajuk: ***"Hinduism dan Penggunaan Tembakau"*** Arahan: Klik dan tonton Nota: -Dalam Hinduism, tembakau dianggap sebagai *vyasana* iaitu pergantungan yang tidak perlu untuk kehidupan. *Vyasana* menghalang pencapaian matlamat hidup spiritual. -Matlamat hidup spiritual dalam Hinduism bermaksud menamatkan penderitaan, memperoleh kebahagian dan kebebasan dari terikat dengan alam. - Hinduism memandang penting kepada jantung yang dianggap sebagai symbol dalam meditasi. -Oleh kerana penggunaan tembakau menyebabkan penyakit jantung, ia dianggap sebagai satu serangan terhadap kesucian ciptaan tuhan. - Maka, penggunaan produk tembakau perlu dihadkan kerana kesan negative tehadap kesihatan diri dan orang lain.
Unit 4 – Kristian dan penggunaan tembakau	
Aktiviti	Tajuk: ***"Kristian dan Penggunaan Tembakau"*** Arahan: Klik dan baca Nota: - Sejak tahun 2000, Gereja Roman Katolik telah mengakui kedudukan mereka terhadap penggunaan produk tembakau dan kesan bahaya terhadap kesihatan. - Majlis Pontifical telah menegaskan idea "*mens sana, in corpore sano" (sound mind, sound body)* yang menganggap penggunaan produk tembakau adalah bahaya untuk kesihatan.

Sub-modul 5: Penggunaan Tembakau dan Undang-undang

Pengenalan

Peraturan Kawalan Hasil Tembakau 2004 (Akta Makanan,1983) telah termaktub larangan mengenai iklan hasil tembakau dan tajaan, kawalan penjualan hasil tembakau, larangan mengenai merokok, peruntukan berhubung dengan orang belum dewasa, pelabelan dan pembungkusan. Diperingkat sekolah, tindakan tatatertib boleh dikenakan kepada pelajar sekolah yang didapati menggunakan produk tembakau di kawasan sekolah (KPM SPI Bil 4, 1997).

Tajuk	***"Penggunaan Tembakau dan Undang-undang"***
Objektif	1. Untuk meningkatkan pengetahuan mengenai peraturan sekolah di Malaysia tentang penggunaan produk tembakau dikalangan remaja 2. Untuk meningkatkan pengetahuan mengenai undang-undang negara Malaysia tentang penggunaan produk tembakau dikalangan remaja
Komponen	Unit 1 – Undang-undang Malaysia dan penggunaan tembakau Unit 2 – Peraturan sekolah di Malaysia dan penggunaan tembakau
Unit 1 – Peraturan sekolah di Malaysia dan penggunaan tembakau	
Objektif	Untuk meningkatkan pengetahuan mengenai peraturan sekolah di Malaysia tentang penggunaan produk tembakau
Aktiviti	**Penerangan**
Aktiviti	Tajuk: ***"Peraturan sekolah di Malaysia dan penggunaan tembakau"*** Arahan: Klik dan tonton Nota: Merujuk kepada Surat Pekeliling Ikhtisas Bil.6A/1975 Ruj.KP.8548/8(75) bertarikh 5 September 1975, bagi menangani masalah disiplin merokok dikalangan murid-murid, langkah-langkah berikut peru diambil; 1. Guru-guru Besar hendaklah memberitahu kepada murid-murid pada masa perhimpunan disekolah bahawa; -menghisap rokok adalah dilarang untuk murid-murid sekolah kerana sebab-sebab kesihatan -menghisap rokok membawa kepada penggunaan dadah -sekolah dalam peranannya sebagai ibu bapa kedua (*in loco parentis*) mempunyai tanggungjawab untuk melindungi murid-murid dari aktiviti yang akan merosakkan individu-individu dan membahayakan institusi -semua murid-murid mestilah diberi amaran bahawa tindakan disiplin akan diambil terhadap mereka jika

	peraturan ini tidak dipatuhi -tempoh pengampunan (*period of grace*) selama seminggu akan diberi kepada murid-murid untuk membuat pengakuan jika mereka telah merokok dengan jaminan bahawa tindakan disiplin tidak akan diambil terhadap mereka itu. 2. Guru-guru penolong sekolah hendaklah diminta memperhatikan murid-murid yang merokok. 3. Apabila seseorang murid didapati menghisap rokok langkah-langkah berikut hendaklah diambil: a.Tindakan disiplin yang sewajarnya hendaklah diambil b.Ibu bapa/penjaga murid itu hendaklah diberitahu bahawa kerjasama mereka diperlukan untuk membantu murid berhenti merokok c.Murid itu hendaklah dirujukkan kepada guru panduan untuk perundingan(counceling) dan nasihat. d.Guru panduan dikehendaki menyimpan rekod-rekod sulit mengenai kejadian dan rekod itu mungkin akan digunakan oleh Kementerian Pelajaran, Jabatan Pelajaran Negeri untuk tujuan statistik dan penyelidikan 4.Tindakan disiplin yang boleh diambil termasuk; - Rotan - Gantung persekolahan - Buang sekolah - Hukuman lain yang difikirkan sesuai seperti "Time-out"
Unit 2 – Undang-undang Malaysia dan penggunaan tembakau	
Objektif	Untuk meningkatkan pengetahuan mengenai undang-undang negara Malaysia tentang penggunaan produk tembakau dikalangan remaja.
Aktiviti	Tajuk: ***"Undang-undang Malaysia dan Penggunaan Tembakau"*** Arahan: Klik dan tonton Nota: Peruntukan undang-undang mengenai merokok, di bawah peraturan kawalan hasil tembakau (2004) pindaan 2011, mengenakan denda sehingga RM 1000.00 jika sabit kesalahan melakukan; 1. penjualan rokok kepada mereka yang berumur di bawah 18 tahun 2. merokok, mengunyah, membeli atau mempunyai hasil tembakau dikalangan mereka yang berumur di bawah 18 3. merokok di kawasan larangan merokok iaitu; -Hospital dan klinik (kerajaan dan swasta)

	-Pusat hiburan dan teater -Lif atau tandas awam -Tempat makan atau kedai berhawa dingin -Kenderaan awam atau hentian pengangkutan awam -Di dalam mana-mana bangunan yang diwartakan oleh menteri -Sekolah dan institusi pendidikan (kerajaan dan swasta) -Lapangan terbang -Premis kerajaan -Dewan orang ramai -Bas sekolah -Tadika, taman asuhan kanak-kanak -Kaunter perkhidmatan awam: a. Bank atau institusi kewangan b. Tenaga nasional berhad c. Pos malaysia berhad d. Telekom malaysia berhad -Kompleks membeli-belah serta kaki limanya -Kompleks sukan -Stadium -Stesen minyak -Kem PLKN -Kafe internet -Perpustakaan -Bangunan tujuan keagamaan -Tempat kerja berhawa dingin dengan sistem hawa dingin berpusat -Kawasan rawat dan rehat (R&R) di lebuhraya

Sub-Modul 6: Efikasi Kendiri

Pengenalan

Persepsi mengenai efikasi kendiri adalah ditafsirkan sebagai kepercayaan seseorang terhadap kemampuan diri untuk mempengaruhi perkara atau keadaan yang memberi kesan ke atas kehidupan individu tersebut (Bandura, 1977; Rosenstock,1990). Mengikut konsep ini, seseorang hanya akan melakukan sesuatu aktiviti atau mampu bertahan bila berada dalam kesusahan sekiranya mempunyai kepercayaan bahawa berupaya untuk mengecapi kesan yang diinginkan. Konsep efikasi kendiri juga membawa maksud ketegasan diri dalam menegakkan pendirian. Efikasi kendiri yang kuat terhadap kesan negatif penggunaan produk tembakau mampu mengelakkan remaja dari mencubanya. Modul ini telah diadaptasi dari Modul Efikasi Kendiri oleh Hashim, Ahmad dan Yusof (2014) dan Modul Latihan Kelab Doktor Muda (KPM & KKM, 2012).

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Tajuk	**Efikasi Kendiri**
Objektif	1. Mendedahkan remaja kepada aspek kepentingan tegas diri 2.Membantu peserta untuk bersifat autonomi dan mampu membuat keputusan untuk dirinya berdasarkan kepercayaan terhadap kebolehan diri. 3. Membantu membina kepercayaan dalam diri peserta bahawa mereka mampu untuk mengurus tingkah laku mereka
Komponen	Unit 1 – Tegas Diri Unit 2 – Saya bijak
Unit 1 – Tegas Diri	
Objektif	1. Untuk menerangkan mengenai definisi tegas diri 2. Untuk menerangkan mengenai faedah tegas diri
Aktiviti	Tajuk: ***"Apa itu Tegas Diri?"*** Arahan: Klik dan tonton Pilih jawapan yang sesuai Nota: Tegas Diri ialah kemampuan seseorang itu; a. menolak permintaan

	b. meluahkan perasaan tanpa menyinggung perasaan orang lain c. memulakan atau menolak perbualan d. membuat permintaan peribadi tanpa merasa tertekan e. berinteraksi secara lisan dan bukan lisan dalam perhubungan seharian f. mengawal perasaan apabila dicabar Peserta memilih jawapan yang sesuai untuk setiap situasi seperti di bawah; 1. Ali diugut supaya membeli rokok oleh pelajar yang lain. Bagaimanakah tindak balas yang Ali patut lakukan? a. Ali menangis b. Ali melawan dengan kata-kata kesat dan menumbuk pembuli c. Ali melaporkan masalah kepada guru, ibu bapa atau ketua kelas 2. Aishah sedang menyiapkan kerja latihan. Guru tiada di dalam kelas. Umi merampas pensil Aishah dan mengajaknya untuk keluar berjalan-jalan dalam kawasan sekolah. Bagaimanakah tindak-balas yang Aishah patut lakukan? a. Tegur rakan dan mengambil pensil semula b. Aishah menangis c. Tegur rakan dan menasihatinya supaya tidak keluar dari kelas Rujukan: Rakos, Richard F. (1991). *Assertive behavior: Theory, research, and training*: Taylor & Frances/Routledge.
Unit 2 – Fikiran Ku	
Objektif	1. Membantu peserta untuk bersifat autonomi dan mampu membuat keputusan untuk dirinya berdasarkan kepercayaan terhadap kebolehan diri. 2. Membantu membina kepercayaan dalam diri peserta bahawa mereka mampu untuk mengurus tingkah laku mereka
Aktiviti	Tajuk: ***"Saya Bijak"*** Arahan: Pilih jawapan yang sesuai Nota: 1. Rakan anda mempelawa sebatang rokok untuk dihisap bersama. Demi menjaga ikatan persahabatan, anda menerima pelawaan rakan. Anda sebenarnya tidak mahu merokok. Adakah anda telah membuat keputusan yang bijak? 2. Rakan anda mempelawa *"vape"* berperisa anggur. Anda

	tidak pernah dan tidak berminat menggunakan *"vape"*. Tetapi anda percaya kata-kata rakan anda bahawa *"vape"* tidak bahaya seperti rokok. Anda mencuba satu sedutan. Adakah anda telah membuat keputusan yang bijak? 3. Anda ingin pulang ke rumah sejurus selepas sesi persekolahan tamat. Rakan-rakan anda mengajak anda bersantai di pasaraya berdekatan. Anda maklum bahawa rakan-rakan anda gemar menghisap shisha di kawasan itu. Anda tetap pulang dengan memberi alasan mempunyai hal keluarga. Adakah anda telah membuat keputusan yang bijak?

Sub-modul 7: Gaya Hidup Sihat

Pengenalan

Amalan kesihatan yang baik dapat membuahkan fikiran yang positif dikalangan remaja dan seterusnya membendung dari melibatkan diri dengan gejala divian termasuk penggunaan produk tembakau. Modul ini merangkumi pengajaran tentang kesihatan mental dan fizikal remaja yang diadaptasi dari Modul Latihan Kelab Doktor Muda Sekolah Rendah (Kementerian Pendidikan Malaysia dan Kementerian Kesihatan Malaysia) dan Modul Kesihatan Reproduktif Remaja (Kementerian Wanita, Keluarga dan Masyarakat).

Tajuk	**Gaya Hidup Sihat**
Objektif	1. Untuk mendedahkan peserta kepada kepentingan dan cara memperolehi minda yang sihat 2. Untuk mendedahkan peserta kepada kepentingan dan cara memperolehi fizikal yang sihat
Komponen	Unit 1 – Saya Berharga Unit 2 – Jauhi Stress Unit 3 – Jom Bersenam
Unit 1 – Saya Berharga	
Objektif	1. Untuk memupuk sikap menghargai diri 2. Untuk memupuk pemikiran positif
Aktiviti 1	Tajuk: ***"Saya Berharga"*** Arahan: Sila tanda klik di kotak yang menunjukkan kekuatan diri. Nota: 1. Harga diri ialah penilaian diri, menghormati orang lain dan perasaan bahawa diri sebagai berguna. Perasaan harga diri mampu membantu seseorang untuk maju, menjadi tegas dan mampu berhadapan dengan tekanan daripada orang lain. 2. Tip-tip untuk membina harga diri; - terima hakikat kekuatan dan kelemahan diri - kembangkan potensi dan bakat diri - sentiasa memperbaiki kelemahan diri - menerima pujian secara positif - memberi pujian kepada orang lain - berfikiran positif 3. Contoh kekuatan diri - mudah berinteraksi dengan orang lain - mudah beradaptasi dengan persekitaran yang baru - mudah bekerjasama dengan orang lain - percaya kepada diri sendiri

	- tidak mudah putus asa - jujur - bertanggungjawab - gigih - berterampilan rapi - suka belajar benda baru - senang berkhidmat - mudah menghafal - tidak mudah tersinggung - pandai dalam pembelajaran - mood yang stabil - suka mengambil bahagian dalam aktiviti - mudah memaafkan orang lain - bersangka baik 4. Contoh kelemahan diri - sukar membuat keputusan - terburu-buru dalam mengerjakan tugas - tidak cermat - tidak mengawal emosi - tidak tegas - pemalu - suka bergantung dengan orang lain seperti ibubapa, adik-beradik atau kawan - mudah mempercayai orang yang baru dikenali - mudah marah - boros - suka memendam masalah - suka memaksa kehendak - penakut - mudah bosan - sensitif dengan perkataan orang lain - malas

<table>
<tr><td>Aktiviti 2</td><td>Tajuk: “Saya Positif”
Arahan: Sila pilih pemikiran yang positif bagi setiap situasi berikut
Nota:
1. Pemikiran positif adalah satu kebolehan di mana seseorang mampu bertindak secara rasional dalam menghadapi sebarang situasi. Ia merupakan satu strategi daya tindak balas dalam mengangani tekanan dengan berkesan.
2. Perbezaan antara pemikiran positif dan negatif
<table>
<tr><td>Situasi</td><td>Negatif</td><td>Positif</td><td>Faedah positif</td></tr>
<tr><td>Gagal dalam matematik</td><td>Saya memang lemah dalam matematik</td><td>Tidak mengapa. Saya akan berusaha lagi.</td><td>Tidak putus asa</td></tr>
<tr><td>Tidak diterima untuk berkawan dengan kumpulan cool di sekolah kerana tidak mahu merokok</td><td>Saya akan keseorangan. Saya tidak cool.</td><td>Tidak mengapa. Ada ramai lagi orang yang saya boleh berkawan. Merokok tidak cool.</td><td>Tidak terjerumus dalam gejala merokok.</td></tr>
</table>
</td></tr>
<tr><td colspan="2">Unit 2 - Jauhi Stres</td></tr>
<tr><td>Objektif</td><td>1. Untuk mengetahui mengenai punca stres
2. Untuk mengetahui mengenai tanda-tanda stres
3. Untuk mengetahui cara-cara menangani stres</td></tr>
<tr><td>Aktiviti 3</td><td>Tajuk: “Stres”
Arahan: Klik dan tonton
Nota:
1. Stres adalah tindakbalas fizikal, emosi dan mental kepada perubahan yang menyebabkan kita berasa risau atau tidak selesa.
2. Punca stress;
- diri sendiri (contoh: tidak menyiapkan kerja sekolah)
- keluarga (contoh: ibubapa bergaduh)
- sekolah (contoh: dibuli rakan sekolah)
- persekitaran (contoh: tiada jiran yang sebaya)
3. Tanda- tanda stress:
- jantung berdegup kencang
- sukar bernafas
- cepat marah
- tidak gembira</td></tr>
</table>

	- tiada selera makan - tidak cukup tidur - hilang minat - ingin membaling sesuatu - mengasingkan diri 4. Cara melegakan stres: - beribadat - bersiar-siar - membaca buku atau majalah yang menenangkan - bersenam - duduk atau baring di tempat yang selamat, sunyi dan selesa - mendengar muzik yang ringan dan menenangkan - bernafas secara mendalam beberapa kali - berbincang dengan rakan, guru atau ibubapa
Unit 2 – Jom Bersenam	
Objektif	1. Untuk mengetahui faedah-faedah bersenam
Aktiviti	**Penerangan**
Aktiviti	Tajuk: ***"Jom Bersenam"*** Arahan: Klik dan tonton Nota: Faedah bersenam: - mengurangkan stress - menjadi cergas dan cerdas - meningkatkan fungsi jantung, paru-paru dan peredaran darah - mengawal berat badan - meningkatkan stamina - menjadi lebih ceria - meningkatkan ketrampilan diri

Sub-modul 8: Saya dan Keluarga

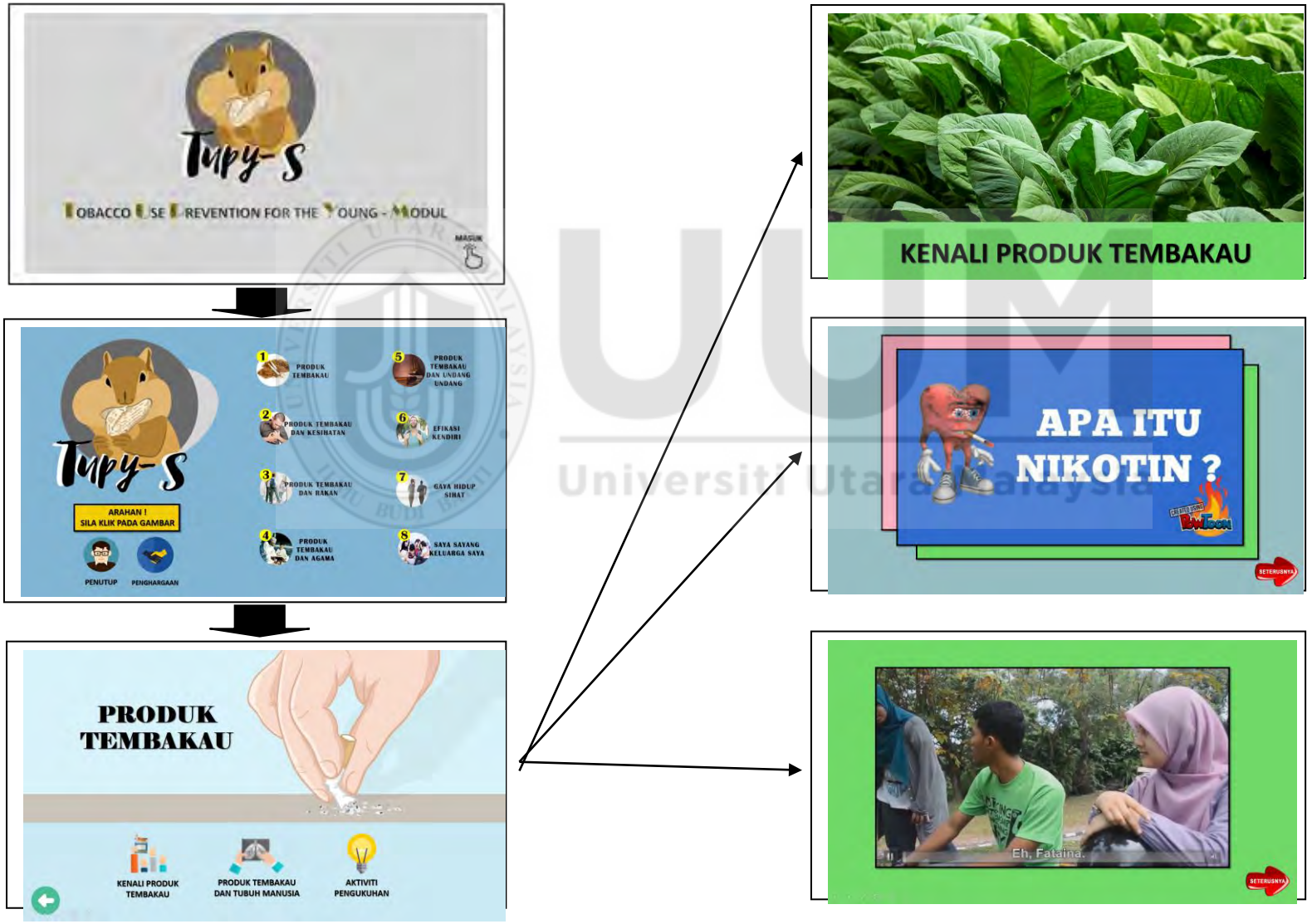
Pengenalan

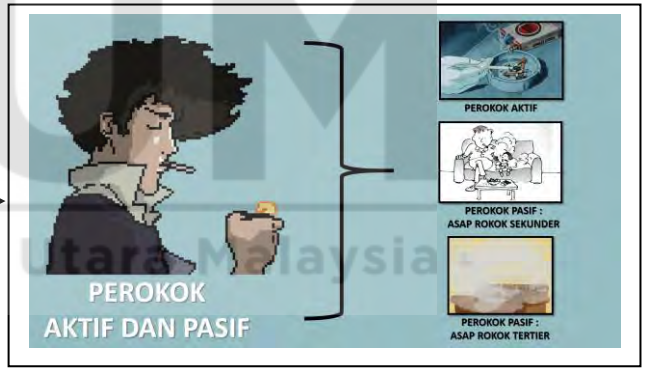
Pengaruh keluarga memainkan peranan yang penting dalam membentuk sahsiah individu terutamanya remaja. Kekuatan ikatan kekeluargaan membentuk semangat kekitaan yang telah terbukti sebagai satu faktor pelindung dari tingkah laku divian. Kekeluargaan yang membawa kepada perasaan menghormati juga memberikan kesan yang positif. Modul ini telah diadaptasi dari Modul Kesihatan Reproduktif Remaja, Kementerian Wanita, Keluarga dan Masyarakat, Malaysia.

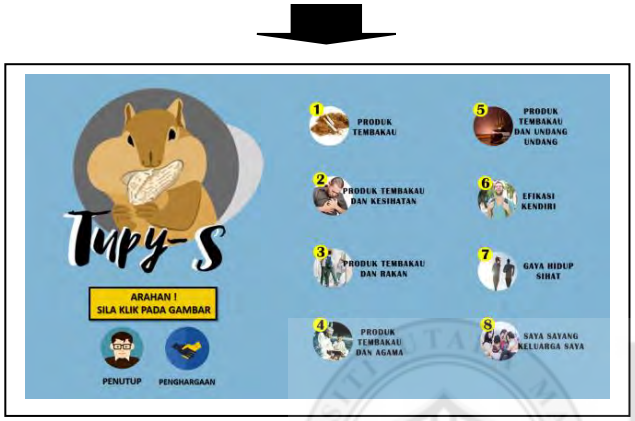
Tajuk	**"Saya dan Keluarga Saya"**
Objektif	1. Untuk mengetahui sifat-sifat seorang remaja 2. Untuk meningkatkan nilai kasih sayang dan menghargai ibubapa 2. Untuk menimbulkan rasa tanggungjawab ke atas keluarga
Komponen	Unit 1 – Saya Unit 2 – Ayah dan Ibu Unit 3 – Keluarga
Unit 1 – Saya	
Objektif	Untuk mengetahui sifat-sifat seorang remaja
Aktiviti	Tajuk: ***"Remaja"*** Arahan: Klik dan tonton Nota: Pelajar menonton persembahan multimedia mengenai sifat-sifat remaja.
Unit 1 – Ayah dan Ibu	
Objektif	Untuk meningkatkan nilai kasih sayang dan menghargai ibubapa.
Aktiviti	Tajuk: ***"Ayah dan Ibu"*** Arahan: Klik dan tonton Nota: Peserta menonton persembahan multimedia sebuah puisi yang mengimbas pengorbanan ibu dan ayah dalam membesarkan anak.
Unit 2 – Keluarga	
Objektif	Untuk menimbulkan rasa tanggungjawab ke atas keluarga
Aktiviti	Tajuk: ***"Keluarga"*** Arahan: Klik dan tonton Nota:

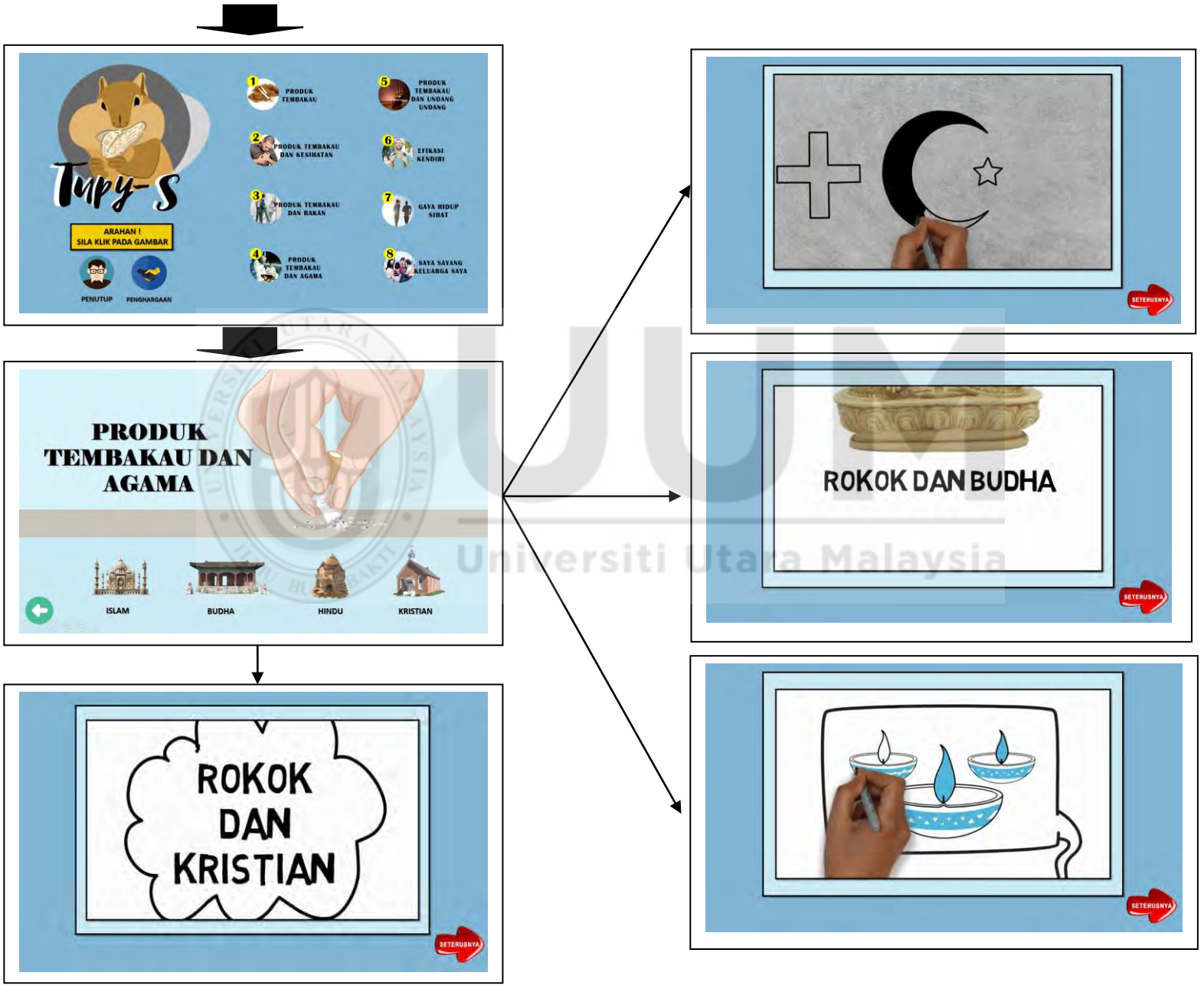
	1. Apa itu keluarga? Burgess & Locke (1945) telah mendefinisikan kekeluargaan sebagai suatu entiti yang membentuk sesebuah masyarakat. Ia dianggotai oleh sekumpulan manusia yang mempunyai ikatan perkahwinan, darah atau diangkat yang tinggal di sebuah rumah dan berinteraksi serta berkomunikasi sesama mereka, dan membina serta mengekalkan budaya mereka sendiri. 2. Tanggungjawab anak-anak ke atas keluarga: a. Tanggungjawab terhadap ibu bapa b. Tanggungjawab terhadap diri sendiri c. Tanggungjawab terhadap adik beradik d. Tanggungjawab terhadap perjalanan kehidupan keluarga Rujukan: 1. Burgess, E. W., & Locke, H. S. (1945). The family: From institution to companionship. New York, NY: American 2. RHAM. (2003). *Modul Kesihatan Reproduktif Remaja*. Malaysia: PPPKM FFPAM

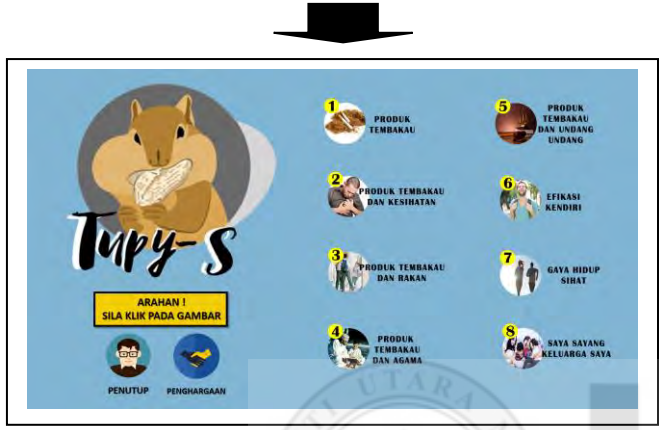
Appendix 9: Screenshots of TUPY-S

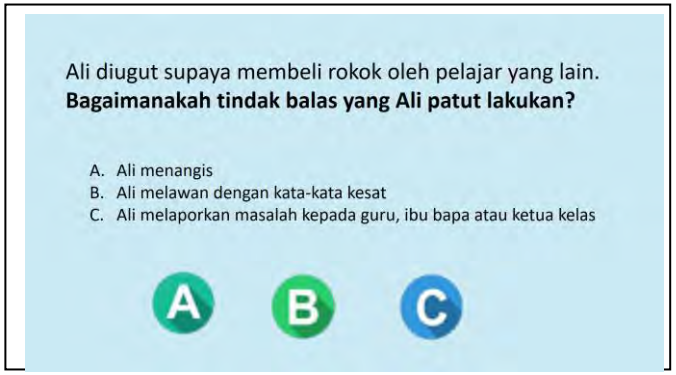


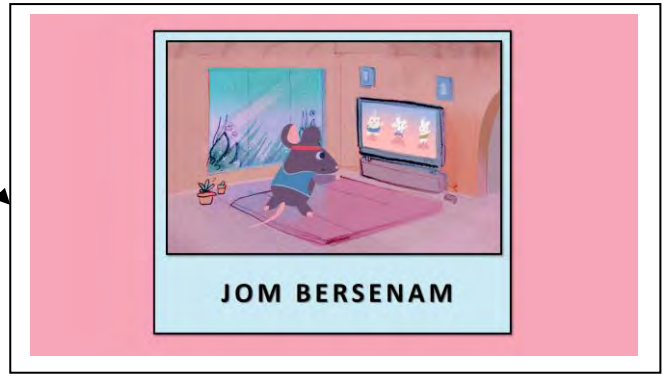


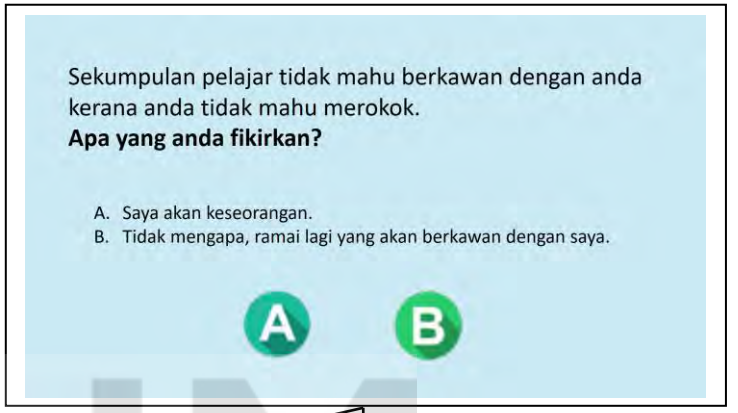


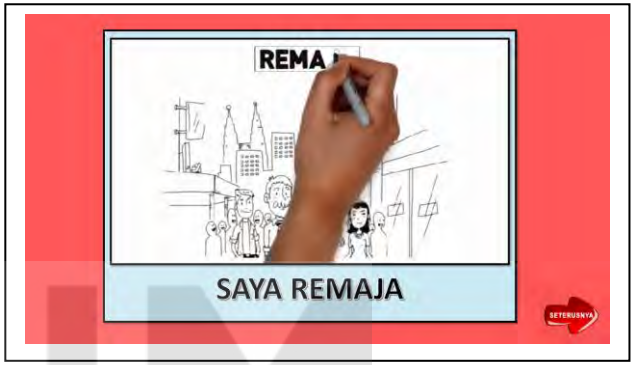


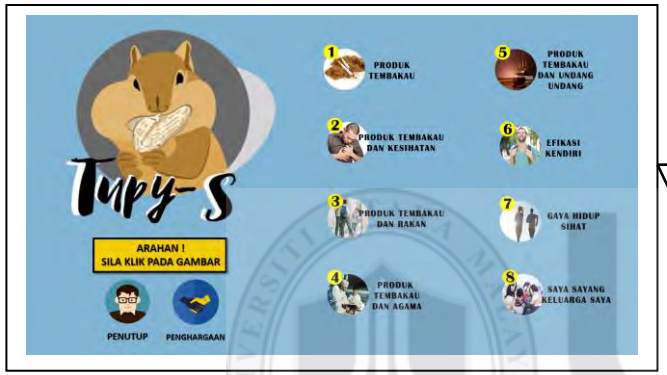








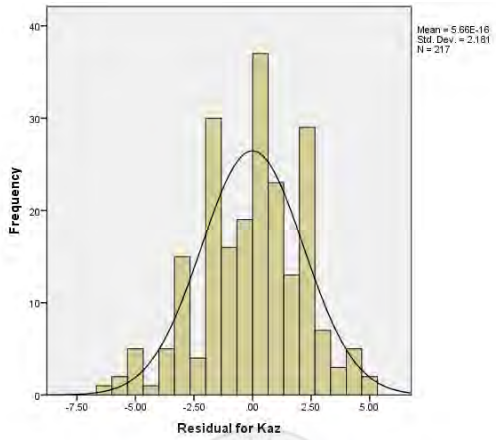


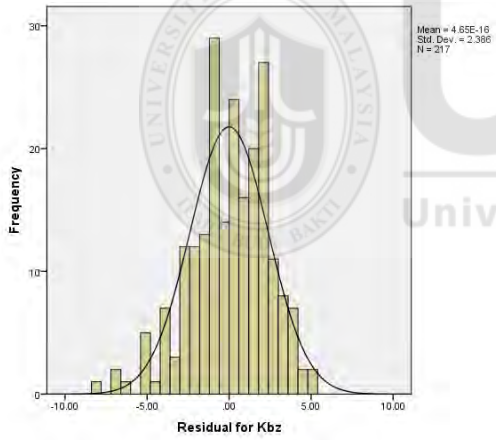


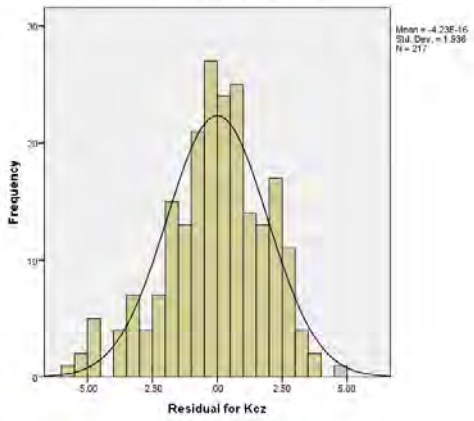
Appendix 10: Checking assumptions for RMANCOVA in Phase -3

A. Knowledge

i. Normality of residuals







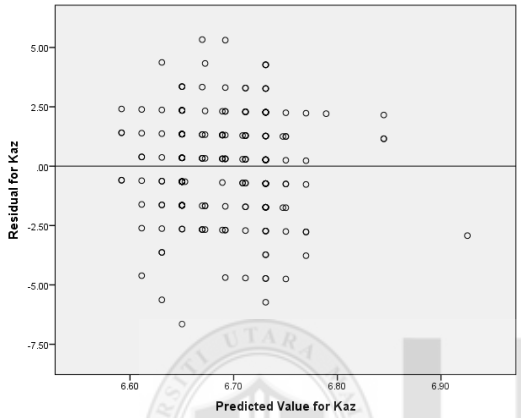
ii. Homogeneity of variance (Levene's test & scatter plot (XP-YR)

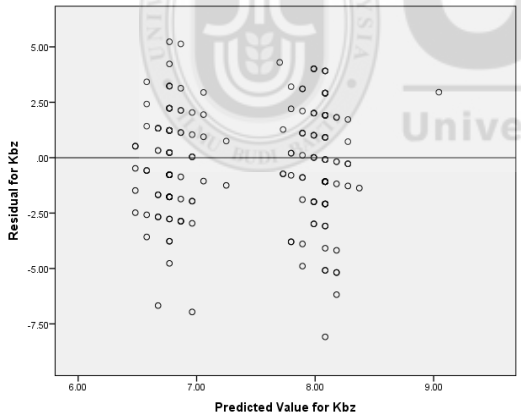
Levene's Test of Equality of Error Variances[a]

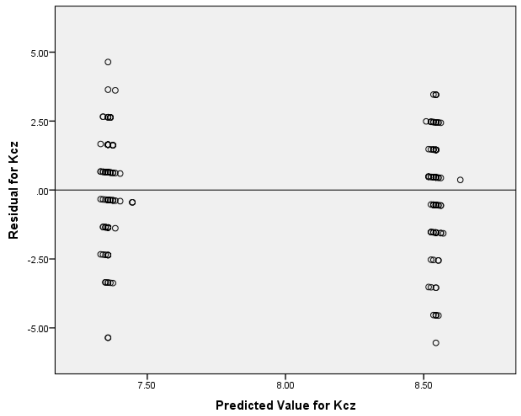
	F	df1	df2	Sig.
Kaz	3.918	1	215	.049
Kbz	2.870	1	215	.092
Kcz	.849	1	215	.358

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time







iii. Assumption of compound symmetry (Mauchly's test of sphericity)

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.965	7.529	2	.023	.966	.984	.500

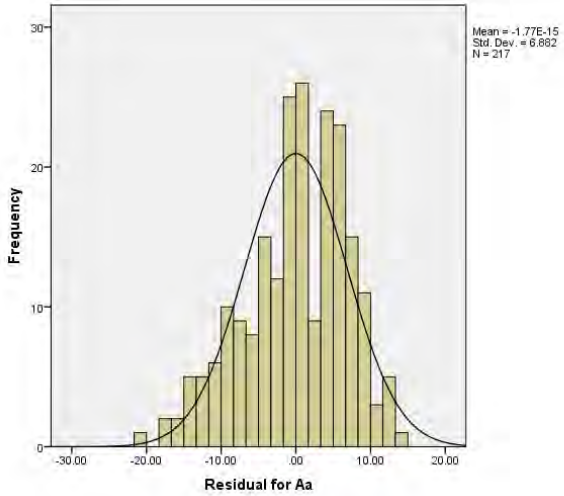
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

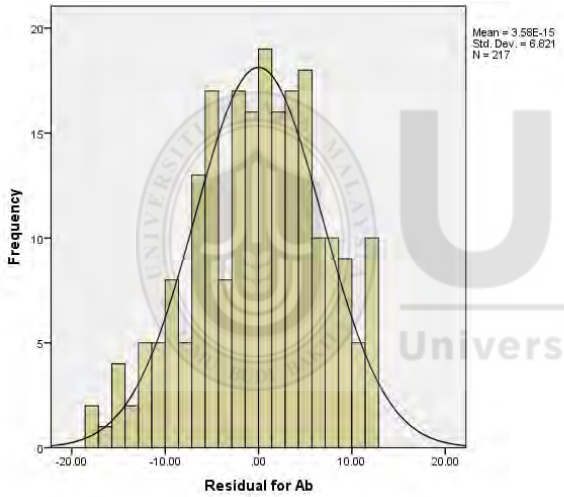
a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time

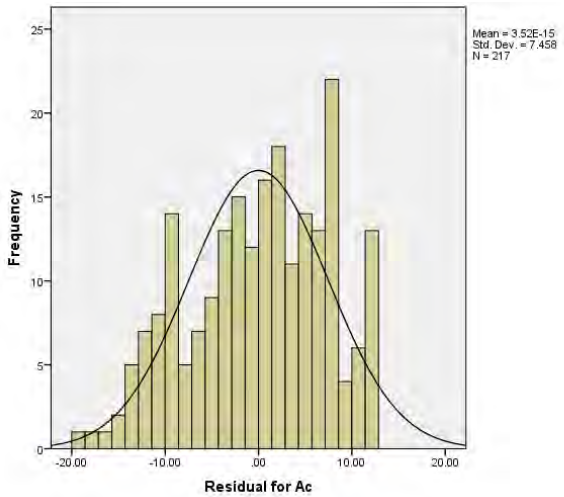
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

B. Attitude

i. Normality of residuals







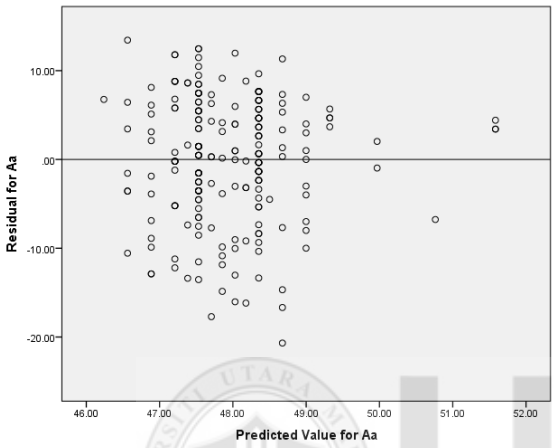
ii. Homogeneity of variance (Levene's test & scatter plot (XP-YR)

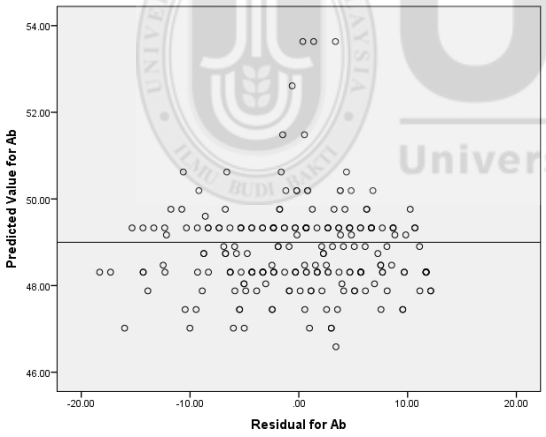
Levene's Test of Equality of Error Variances[a]

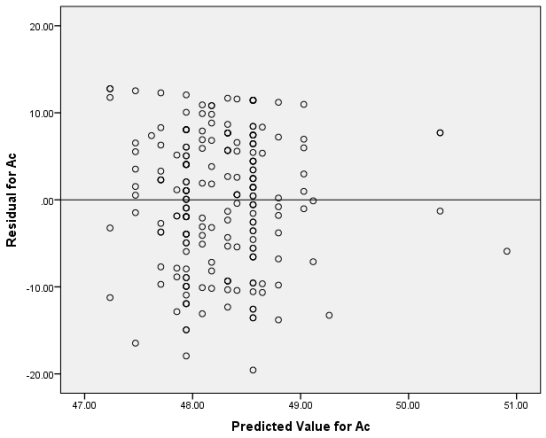
	F	df1	df2	Sig.
Aa	.727	1	215	.395
Ab	4.554	1	215	.034
Ac	.178	1	215	.673

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time







iii. Assumption of compound symmetry (Mauchly's test of sphericity)

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.992	1.653	2	.438	.992	1.000	.500

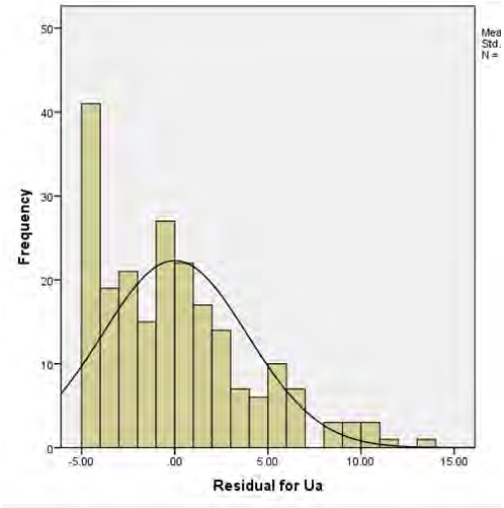
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

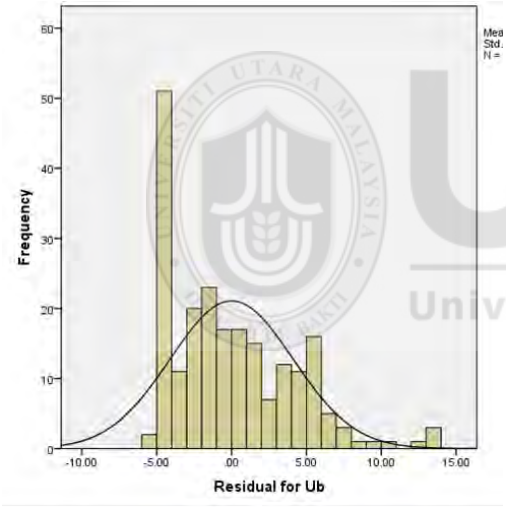
a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time

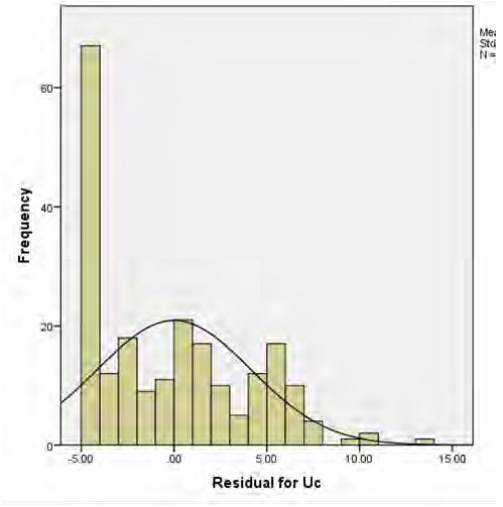
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

C. Intention to use

i. Normality of residuals







ii. Homogeneity of variance (Levene's test & scatter plot (XP-YR)

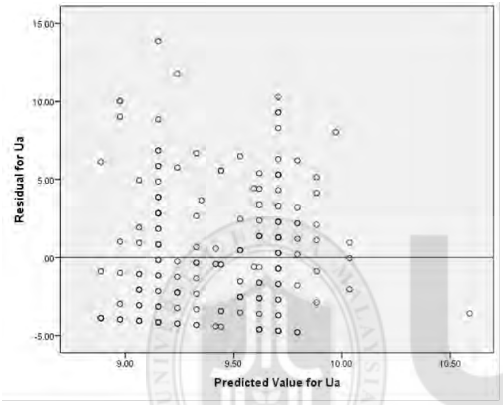
Levene's Test of Equality of Error Variancesa

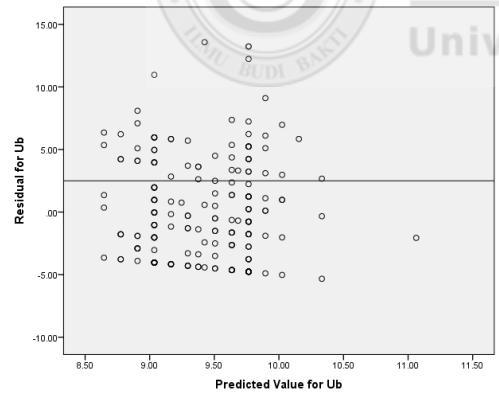
Levene's Test of Equality of Error Variances[a]

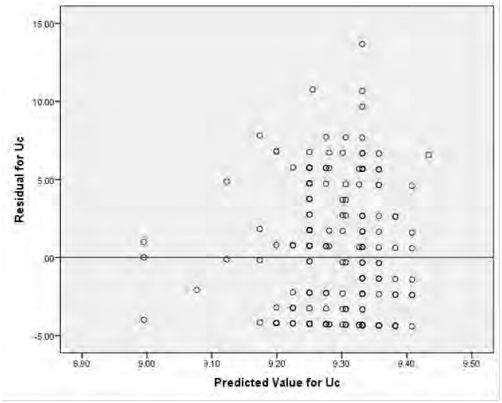
	F	df1	df2	Sig.
Ua	.050	1	215	.823
Ub	.382	1	215	.537
Uc	.953	1	215	.330

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time







iii. Assumption of compound symmetry (Mauchly's test of sphericity)

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.978	4.692	2	.096	.979	.997	.500

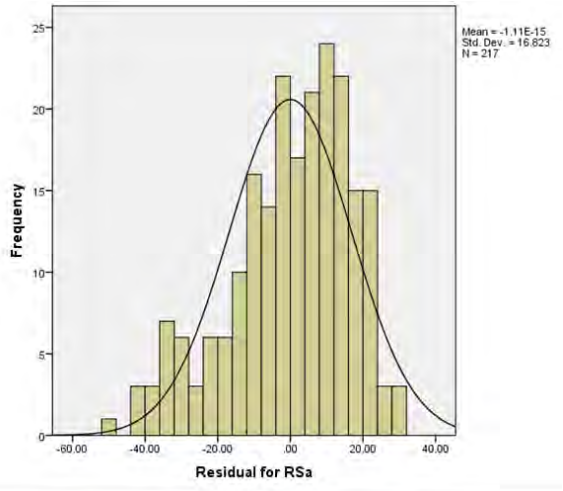
Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

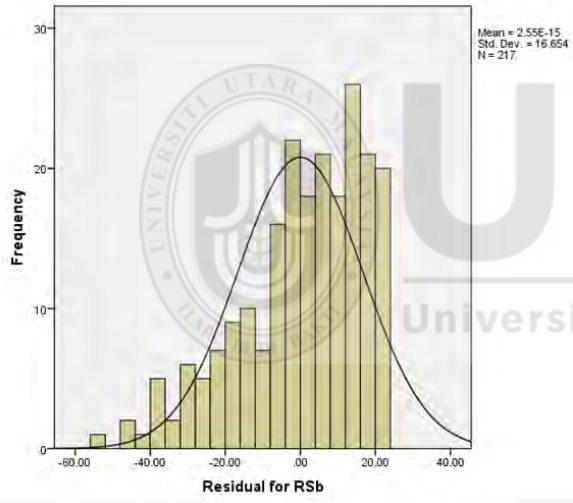
a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time

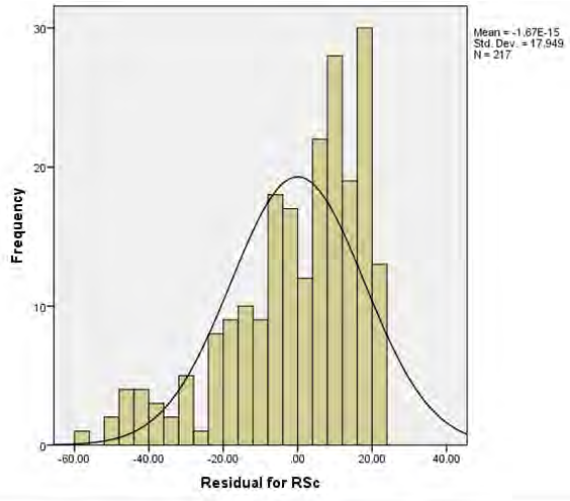
b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

D. Refusal self-efficacy

i. Normality of residuals







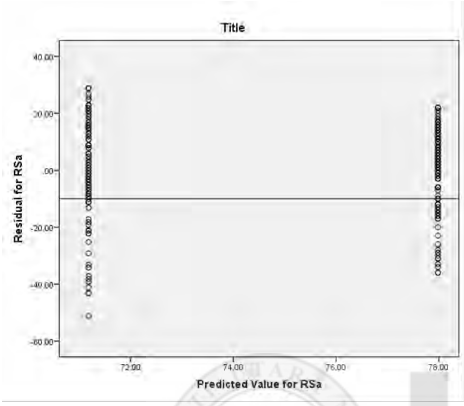
ii. Homogeneity of variance (Levene's test & scatter plot (XP-YR)

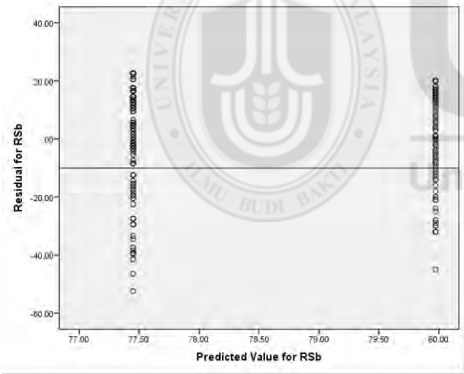
Levene's Test of Equality of Error Variances[a]

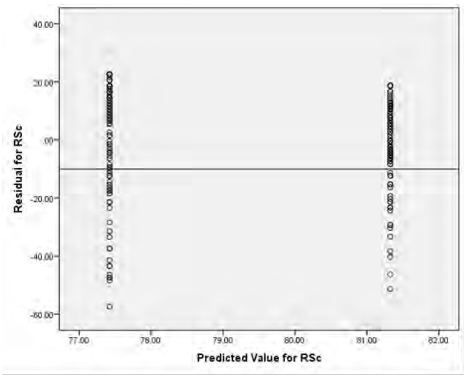
	F	df1	df2	Sig.
RSa	4.004	1	215	.047
RSb	7.114	1	215	.008
RSc	8.207	1	215	.005

Tests the null hypothesis that the error variance of the dependent variable is equal across groups.

a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time







iii. Assumption of compound symmetry (Mauchly's test of sphericity)

Mauchly's Test of Sphericity[a]

Measure: MEASURE_1

Within Subjects Effect	Mauchly's W	Approx. Chi-Square	df	Sig.	Epsilon[b]		
					Greenhouse-Geisser	Huynh-Feldt	Lower-bound
Time	.960	8.755	2	.013	.961	.979	.500

Tests the null hypothesis that the error covariance matrix of the orthonormalized transformed dependent variables is proportional to an identity matrix.

a. Design: Intercept + Pocket_money + group
Within Subjects Design: Time

b. May be used to adjust the degrees of freedom for the averaged tests of significance. Corrected tests are displayed in the Tests of Within-Subjects Effects table.

Appendix 11: Confirmatory factor analysis of TUPY-Q using AMOS